
**UNITED STATES MARINE CORPS
THE BASIC SCHOOL
MARINE CORPS TRAINING COMMAND
CAMP BARRETT, VIRGINIA 22134-5019**

**MILITARY TOPOGRAPHIC
MAP I
B181936
STUDENT HANDOUT**

Military Topographic Map I

Introduction The intent of this lesson is to familiarize you with the military topographic map in order to prepare you for follow on classroom and field instruction in land navigation. Maps provide information on the existence and location of man made features such as buildings, bridges, and routes of travel. They also indicate variations in terrain, the elevation of terrain features, and the extent of vegetation.

Importance Marine officers must consistently strive for overall situational awareness, including, but not limited to, their and the enemy's current position. This lesson will lay the foundation for ensuring you are skilled in the art of land navigation.

In This Lesson This lesson discusses how to evaluate and interpret map information, how maps are created and accounted for, and how to neatly and accurately plot grid coordinates on a map.

This lesson covers the following topics:

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Learning Objectives

Terminal Learning Objective

TBS-PAT-1002 Given a military topographic map, protractor, lensatic compass, and objective, navigate with a map and compass, to arrive within 100 meters of the objective.

Military Topographic Map I (Continued)

Learning Objectives
(Continued)Enabling Learning Objectives

TBS-PAT-1002a Given a military topographic map, identify marginal information, without error.

TBS-PAT-1002b Given a military topographic map, identify contour lines, without error.

TBS-PAT-1002d Given a military topographic map, identify colors on a map, without error.

TBS-PAT-1002e Given a military topographic map, protractor, determine/plot a grid, to within 30 meters.

TBS-PAT-1002f Given a military topographic map, protractor, string, and paper, determine distance using bar scale, to within 25 meters.

TBS-PAT-1002p Given two azimuths from known points or one azimuth and a linear feature, conduct a re-section, to determine your location to within 50 meters.

Material Requirements

For The Basic School land navigation package, you will require the following maps and materials.

Maps	<p>Quantico—1:50,000 Special.</p> <p>New River—V742 5553 III.</p> <p>Margarita Peak—V795 2550 IV.</p>
Mapping Gear	<hr/> <p>Straight edge with map scale markings.</p> <p>Protractor.</p> <p>Lead pencils and black ball point pens.</p> <p>Fine tip mapping pens.</p> <p>Pencil sharpener.</p> <p>Eraser (pencil and alcohol pen).</p> <p>Whistle.</p> <p>Waterproof bag—Ziploc bag, etc.</p>
Lamination	<hr/> <p>Laminate your 1:50,000 Quantico land navigation special map sheet. We <i>highly recommend</i> that you laminate the map either at the Lamination Station at the Marine Corps Exchange on board Camp Barrett or at The Scholarship in Aquia Towne Centre. <i>Do not</i> laminate the map at Staples, as their lamination is very thick and is not conducive to folding.</p> <p>When preparing your map for lamination,</p> <ul style="list-style-type: none"> • Trim and SAVE the marginal information. • Tape/paste the marginal information to the back of your map BEFORE you laminate the map.

Marginal Information

Use marginal information for:

- Identification — indicates which area coverage the map represents.
- Interpretation — provides correlation between actual terrain features and map topographic symbols.
- Evaluation — helps determine the validity of the information represented on the map.

The elements contained in marginal information are listed below with a brief description. Refer to the diagram on page 6 to see where the elements appear on a map as indicated by the number in parentheses after the name of each element.

Sheet Name (1)	The sheet name describes the most significant terrain feature covered by a particular map (cities, mountains, etc.)
Series and Sheet Number (2 and 5)	Numbers are provided for organization and accounting purposes. The sheet number refers to a specific map; a series contains numerous sheets.
Series Name (3)	A collection of maps representing a specific geographical area has a series name.
Scale (4)	The scale is a ratio of map to real-world coverage; depicted using a colon or a comma, as in 1:50,000.
Edition Number (6)	The edition number is the production version number; a high number indicates a more recent map. Sources are Defense Mapping Agency (DMA) or National Imagery Mapping Agency (NIMA).
Index to Adjoining Sheets and Boundaries (7 and 8)	The index displays sheet and series numbers for maps that cover areas adjacent to those covered by a particular map and the political boundaries of an area.
Elevation Guide (9)	The elevation guide gives a general overview of the elevation of the terrain covered by the map.
Declination Diagram (10)	The declination diagram provides a reference showing declinations of grid North and magnetic North from true North.
Bar Scales (11)	The bar scales show straight line distances in kilometers, statute miles, and nautical miles.

Marginal Information (Continued)

Contour Interval Note
(12)

The contour interval note describes the elevation change between consecutive contour lines:

- Horizontal datum indicates the collection of data from which the grid reference system is based.
ALWAYS CHECK THE HORIZONTAL DATUM!
- Vertical datum indicates the collection of data from which the elevation data is based.

Legend (13)

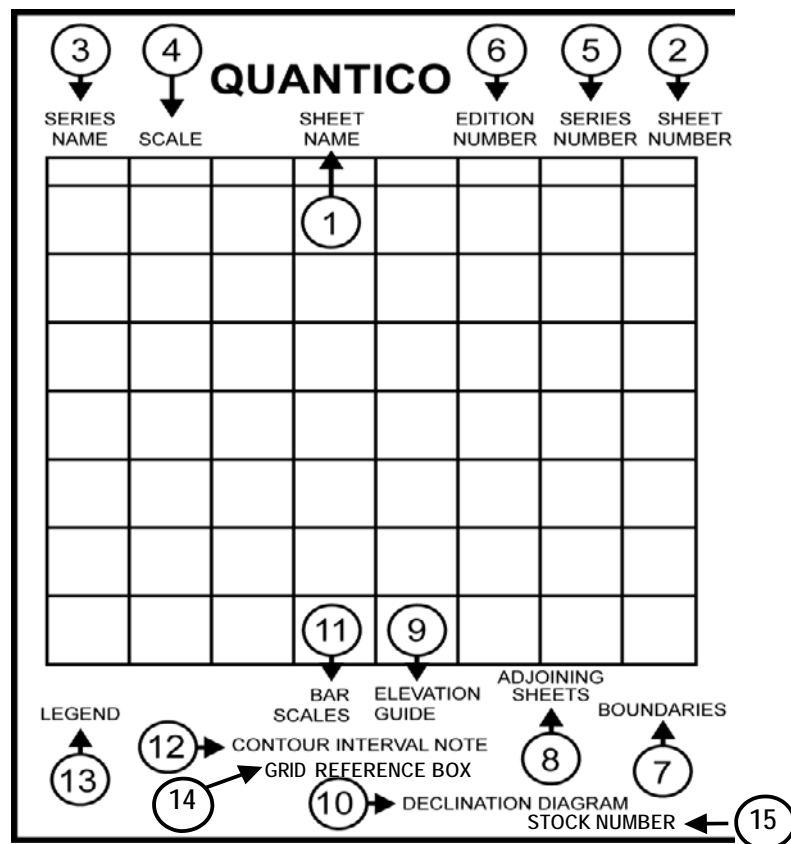
The legend provides the key for interpreting the map symbols.

Grid Reference Box (14)

The grid reference box provides information indicating the 100,000 meter grid square identifier and grid zone designator for a particular map, as well as information on plotting specific points to an accuracy of 100 meters.

Stock Number (15)

Use the stock number to reorder maps from NIMA.



Topographic Symbols

Topographic symbols are symbols used on a map to represent actual terrain features.

Colors

Colors represent different terrain features. The colors that may be used on a map are:

- Black: manmade features.
- Brown: terrain features.*
- Green: vegetation.
- Blue: water.
- Red: road conditions and built-up areas.*

***Note:** Recent maps show only four colors. In 1982, brown and red colors were combined to make military maps red-light readable. Likewise, the features these colors represent are also combined, i.e., red/brown represents terrain features, roads, and built-up areas.

Military Grid Reference System

The Military Grid Reference System (MGRS) is the geographic standard used by the United States armed forces and NATO for locating any point on the earth with a 2 to 10 character geocode. A two digit code implies a precision of 10 km; a ten digit code corresponds to a 1 m precision with intermediate steps of 1 km, 100 m, and 10 m. The geocode is always displayed in an even number of characters preceded by an alpha-numeric code describing the larger Earth area to which it belongs.

Military Grid Reference System (Continued)

How to Plot/Read MGRS Coordinates

Be neat and accurate with all map work! All information required to correctly read/plot a grid coordinate is in the marginal information!

To plot MGRS coordinates,

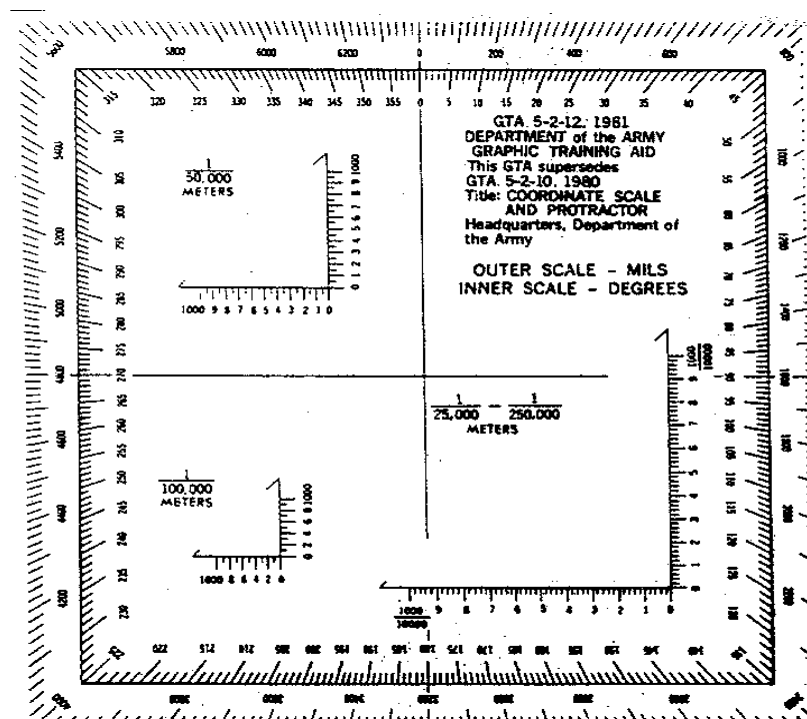
- Identify the correct grid square.
- Correctly orient your protractor on the grid square.
- **“RIGHT THEN UP.”**

Read MGRS coordinates, for example, 18S TT 8750 6380 (Camp Barrett) as follows:

- 18S: Grid zone designation: 6 degrees x 8 degrees
- TT: 100,000 meter grid square
- 875 638: 6 digit grid = 100m accuracy
- 8750 6380: 8 digit grid = 10m accuracy
- 87500 63800: 10 digit grid = 1m accuracy

Protractor

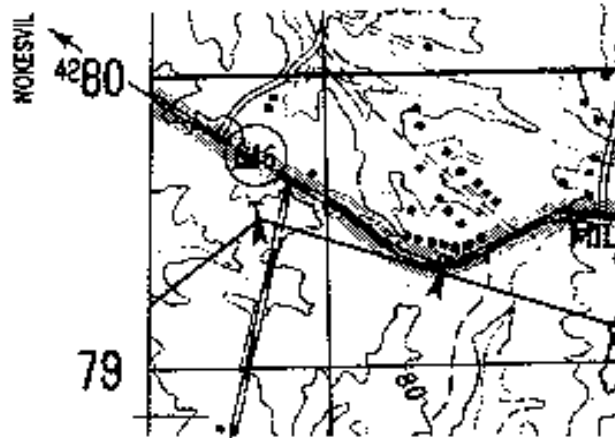
Be sure to use the correct scale when plotting/reading grid coordinates and to correctly orient your protractor (see diagram below) with respect to the map.



Military Grid Reference System (Continued)

Partial Grid Squares

If a plotted point lies within a partial grid square, you have to reconstruct the grid square in order to accurately plot or read an eight-digit grid coordinate (see diagram below).



The table below lists the steps for reconstructing the grid square to accurately plot or read an eight-digit grid coordinate.

Step	Action
1	Using the coordinate scale on your protractor, draw in the incomplete sides of the grid square out to 1000 meters for each side. You will have to rotate the coordinate scale for each side to accomplish this step.
2	Utilize the same technique for reading or plotting an eight-digit grid coordinate on a complete grid square to read or plot your eight-digit grid coordinate.

Graphic Scale and Distance on a Map

Maps are categorized by their scale:

- Large scale: 1:75,000 and larger.
- Medium scale: Smaller than 1:75,000 and larger than 1:600,000.
- Small scale: 1:600,000 and smaller.

Small unit leaders primarily utilize large-scale maps and some medium scale maps.

Graphic Scale and Distance on a Map (Continued)

Large Scale Maps

Large scale maps

- Cover relatively small area.
- Contain good detail.
- Are used for tactical purposes.

Medium Scale Maps

Medium scale maps

- Cover a larger area.
- Contain less detail.
- Are used for strategic purposes and aerial navigation.

Small Scale Maps

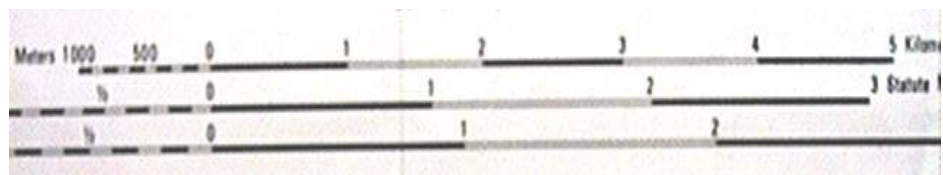
Small scale maps

- Cover an extremely large area.
- Contain almost no detail.

Graphic Scale

A graphic scale is a pre-measured map distance corresponding to a certain ground distance (see diagram below). The map distance is marked off as a straight line in the margin of the map sheet, then subdivided and labeled in terms of the corresponding ground distance. This scale enables you to measure distances by visual examination, avoiding lengthy and repetitive calculations. Military maps contain several graphic scales to allow quick measurements of ground distance in different units (i.e., meters/kilometers, statute miles, and nautical miles) and to enable you to convert from one unit of measure to another quickly and easily. The parts of the graphic scale are

- Primary scale
- Extension scale



Graphic Scale and Distance on a Map (Continued)

Measuring Ground Distance

The methodology for using the graphic scale depends whether the distance is

- Straight-line distance.
- Curved-line distance.

Distance measurement on a map *does not* take into account changes in elevation.

Requirement 1 Review Questions

Requirement 1 map: Virginia, 1:50,000, Quantico MIM LND NAV SPECIAL, Edition 2-NIMA.

1. What are the map sheet number and series number on which you would find grid square (GS) 9572?
Answer: Map sheet number _____
Answer: Series number _____

 2. What are the coordinates of the following objectives to the nearest 100 meters?
 - a. Bench Mark in GS 9177 Answer: _____
 - b. Little Union Ch in GS 9572 Answer: _____
 - c. 617B GATE in GS 8470 Answer: _____
 - d. Major road intersection in GS 9378 Answer: _____

 3. What are the map sheet number and series number on which you find grid square 8959?
Answer: Map sheet number _____
Answer: Series number _____

 4. What is located at each of the following coordinates?
 - a. 03437485 Answer: _____
 - b. 99287380 Answer: _____
 - c. 86277683 Answer: _____

 5. What are the coordinates of the following objectives to the nearest ten meters?
 - a. Tank in GS 9574 Answer: _____
 - b. Horizontal Control Station in GS 9570 Answer: _____
 - c. Intersection of stream and unimproved surface road in SE corner road of GS 9079 Answer: _____
 - d. Bridge in GS 9863 Answer: _____
 - e. School in GS 8361 Answer: _____

 6. What are the map sheet number and series number on which you would find GS 7470?
Answer: Map sheet number _____
Answer: Series number _____

 7. What is located at each of the following coordinates:
 - a. 92508040 Answer: _____
 - b. 95347903 Answer: _____
 - c. 00407965 Answer: _____
 - d. 91107951 Answer: _____
 - e. 95847196 Answer: _____
-

Requirement 1 Review Questions (Continued)

8. What are the 8-digit grid coordinates of the following objectives?
- a. Post chapel in GS 9865 Answer: _____
 - b. Community College in GS 0077 Answer: _____
 - c. LZ VIP pit in GS 9864 Answer: _____
 - d. Cemetery in GS 8778 Answer: _____
 - e. Tower in GS 8365 Answer: _____
-

Requirement 2 Review Questions

Requirement 2 map: Virginia, 1:50,000, Quantico MIM LND NAV SPECIAL, Edition 2-NIMA

1. What are the map sheet number and series number on which you would find grid square (GS) 8175?
Answer: Map sheet number _____
Answer: Series number _____

 2. What is located near each of the following coordinates?
 - a. 954753 Answer:
 - b. 033704 Answer:
 - c. 880730 Answer: _____

 3. What are the coordinates of the following objectives to the nearest hundred meters?
 - a. Church in GS 9579 Answer:
 - b. Woodbridge MS in GS 0180 Answer:
 - c. Church in GS 0378 Answer:
 - d. Road intersection in GS 8967 Answer:
 - e. Stream junction in GS 8671 Answer: _____

 4. What are the map sheet number and series number on which you would find grid square 0679?
Answer: Map sheet number _____
Answer: Series number _____

 5. What is located at each of the following coordinates?
 - a. 86387530 Answer:
 - b. 92356690 Answer:
 - c. 95457225 Answer: _____

 6. What are the coordinates of the following objectives to the nearest ten meters?
 - a. Hawkins Bar in GS 8764 Answer:
 - b. Night Lab in GS 8763 Answer:
 - c. VA DMV in GS 8861 Answer: _____

 7. In what state and county are grid coordinates 02536411 located?
Answer: State: _____
Answer: County: _____

 8. What is located at each of the following coordinates?
 - a. 94486868 Answer:
 - b. 87996464 Answer:
 - c. 04158970 Answer: _____
-

Requirement 3 Review Questions

Requirement 3 map: Virginia, 1:50,000, Quantico MIM LND NAV SPECIAL, Edition 2-NIMA.

1. What are the map sheet number and series number on which you would find coordinate 05007000?
Answer: Map sheet number _____
Answer: Series number _____

 2. What are the coordinates of the following objectives to the nearest hundred meters?
 - a. Radio TWRS in GS 8778 Answer: _____
 - b. Horz CNTRL Station in GS 9570 Answer: _____
 - c. Junction of perennial and intermittent stream in GS 9268 Answer: _____
 - d. Gravel pit in GS 9572 Answer: _____

 3. What are the map sheet number and series number on which you would find grid square 8282?
Answer: Map sheet number _____
Answer: Series number _____

 4. What are the coordinates of the following objectives to the nearest ten meters?
 - a. Hard surface road and unimproved road junction nearest BM 87.7 in GS 9376
Answer: _____
 - b. BM 73.0 in GS 9570 Answer: _____
 - c. Fire station in GS 9681 Answer: _____
 - d. Power line junction GS 7674 Answer: _____

 5. What is located at the following grid coordinates?
 - a. 90657486 Answer: _____
 - b. 95507285 Answer: _____
 - c. 86606628 Answer: _____

 6. What are the map sheet number and series number on which you would find the coordinate 04007500?
Answer: Map sheet number _____
Answer: Series number _____
-

Requirement 1 Review Answers

1. Map sheet number 5561 IIII
Series number V734

 2. 6-digit grid coordinates; no tolerance.
 - a. 910776
 - b. 955729
 - c. 848706
 - d. 933785

 3. Map sheet number 5560 IV
Series number V734

 4.
 - a. Railroad bridge
 - b. Road junction
 - c. Stream junction

 5. Questions requiring accuracy to the nearest 10 meters require an 8-digit grid coordinate as an answer. Your 8-digit grid coordinate should be within 50 meters of the solution.
 - a. 95007479
 - b. 95407065
 - c. 90757925
 - d. 98506375
 - e. 83766163

 6. Map sheet number 5461 II
Series number V734

 7.
 - a. Cemetery
 - b. Church
 - c. Potomac Mills
 - d. Road junction
 - e. Building

 8. Answers should be within $\pm 50\text{m}$ of the solution.
 - a. 98346515
 - b. 00357725
 - c. 98896450
 - d. 87747895
 - e. 83646540
-

Requirement 2 Review Answers

1. Map sheet number 5461 II
Series number V734

 2.
 - a. Reid School
 - b. Cockpit Point
 - c. LZ Oriole

 3.
 - a. 953790
 - b. 015803
 - c. 035784
 - d. 895671
 - e. 869711

 4. Map sheet number 5561 II
Series number V734

 5.
 - a. LZ Finch
 - b. Gray's Pond
 - c. Gravel pit

 6.
 - a. 87126412
 - b. 87456395
 - c. 88606125

 7. State: Maryland
County: Charles County

 8.
 - a. Power-transmission line junction
 - b. Gravel pit
 - c. Possum Nose
-

Requirement 3 Review Answers

- 1. Map sheet number 5561 II
Series number V734

- 2. Questions requiring accuracy to the nearest 100 meters require a 6-digit grid coordinate as an answer.
 - a. 877783
 - b. 954706
 - c. 924680
 - d. 954723

- 3. Map sheet number 5461 III
Series number V734

- 4. This requires an 8-digit grid coordinate. Each answer must be within 50 meters of the solution.
 - a. 93857635
 - b. 95307065
 - c. 89486702
 - d. 76527473

- 5.
 - a. Unimproved road and trail intersection
 - b. Little Union Church
 - c. LZ Owl

- 6. Map sheet number 5561 III
Series number V734

