

Section 1



MAP READING

Key Points

- 1 Using the Marginal Information and the Symbols on a Military Map
- 2 Identifying Colors on a Military Map
- 3 Using Contour Lines to Determine Elevation
- 4 Identifying Terrain Features
- 5 Using Four-, Six-, and Eight-Digit Grid Coordinates to Determine a Location

Few factors contribute as much to the survivability of troops and equipment and to the successful accomplishment of a mission as always knowing where you are.

From Field Manual 3-25.26, Map Reading and Land Navigation

Introduction

A map is one of the most important pieces of equipment you will use as an Army leader. The ability to use a map to learn your location and get where you are going is one of your most important skills as an Army officer.

This section will review and expand on the parts of a military map and how to use them. You will want to master these skills now to move on to the more complicated information provided in the next sections.

For some Cadets, parts of this discussion will be review. To some, it may be new. All of it will be critical to your success as a Cadet within the ROTC program and your success as an officer.

You may remember hearing about PFC Jessica Lynch, whose convoy took a wrong turn during the Iraq war in March 2003 and stumbled into hostile territory. Several Soldiers were killed and several others captured. Another convoy, operating in the same region several weeks later, might have repeated the navigational errors that led to that incident in March, had not its battalion commander intervened.

Convoy Lost Near Basra Returns to Safety of Base

BASRA, Iraq—A lightly armed convoy of the 5th Battalion Combat Engineers got lost near Basra on [April 11, 2003] and returned to its base rather than proceed on potentially dangerous roads in southern Iraq.

LTC Robert Sinkler, the battalion commander, ordered the four-Humvee convoy to turn back to its camp in northern Kuwait without accomplishing its mission. The sergeant directing the convoy from the lead vehicle was proceeding using an Army global positioning system without coordinating it with a map.

“I just don’t have any faith and confidence that he can get us where we need to go,” said Sinkler, who was in the convoy. “He is not aware of a safe and secure route . . . to take. I was not aware of that when we left.”

The episode showed how easy it is to get lost despite the best technology. It also raised a reminder of the ambush during the early days of the Iraq war when a supply company took a wrong turn. Several Soldiers were killed, wounded, and captured.

“This is exactly the kind of thing that happens,” Sinkler said. “We can’t afford to allow this to happen.”

The convoy was en route from Camp Pennsylvania in northern Kuwait to a supply base in Iraq known as Logistical Support Base Adder. . . .

After about three hours on the road and snaking through parts of southwestern Basra it was clear that a wrong turn had been made. The convoy retraced its way through Basra, got on a highway and stopped again.

After a 15-minute conference among Sinkler, Cline and SGT Brian Miller, 25, of Bemidji, Minn., Sinkler ordered the convoy to head back to camp. Miller was the noncommissioned officer directing the convoy from the lead vehicle.

“You don’t want to find yourself in this situation again,” Sinkler said. “You need to know the route and have the route memorized. You can’t use your GPS alone, and unfortunately someone tried to.”

Miller was using a “precision lightweight GPS receiver.” The Soldiers refer to them as “pluggers.” The device shows them the direction of getting from one point to another. The points, known as “waypoints,” are stored as map grid coordinates. A battalion staff officer had stored the waypoints in Miller’s “plugger” for the trip between Camp Pennsylvania and Adder. Miller was picking roads as he went when the GPS system was telling him to change directions. But he was not following a map at the same time. . . .

Sinkler said that when the entire battalion goes into Iraq, there has to be more rehearsal for that trip.

“They are going to bring some good lessons back,” Sinkler told a reporter. To Smith, his driver, Sinkler said, “We’re never going to allow this to happen again.”

St. Louis Post-Dispatch

Critical Thinking

Did LTC Sinkler make the right decision in returning to base without completing his mission? Why or why not? Could he have done anything before departing to avoid the difficulties his convoy encountered? What is the most important lesson of this story?

Using the Marginal Information and the Symbols on a Military Map

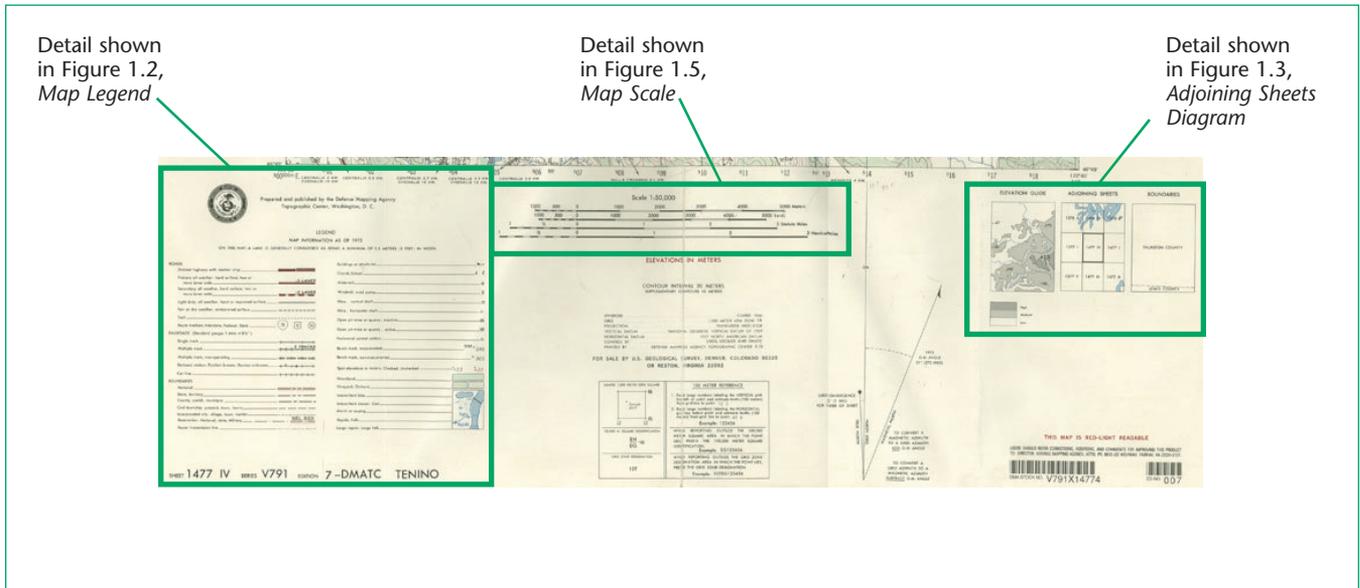
legend

the section on a map that contains the symbols you need to read the map

A map is a graphic representation of the earth’s surface as seen from above and drawn to scale. To read a map, however, you must understand the symbols, colors, scale, and other information found in the map’s margin—which you can usually find at the bottom of the map sheet.

The **legend** identifies the symbols the mapmakers use to show how the map presents the terrain’s natural and man-made features. These symbols are not the same on every map, especially foreign maps, so you should always check the legend to avoid making mistakes.

The *sheet name and number* give you the map’s title and reference number. Maps usually take their sheet names from the largest settlement or the largest natural feature on the map. For example, the “Tenino Map” includes the community of Tenino, Wash. The sheet number is in bold print in the upper right and lower left areas of the margin. When you order a map, you will use the sheet number to identify the map you want.



Detail shown in Figure 1.2, Map Legend

Detail shown in Figure 1.5, Map Scale

Detail shown in Figure 1.3, Adjoining Sheets Diagram

Figure 1.1 Marginal Information at the Bottom of a Military Map

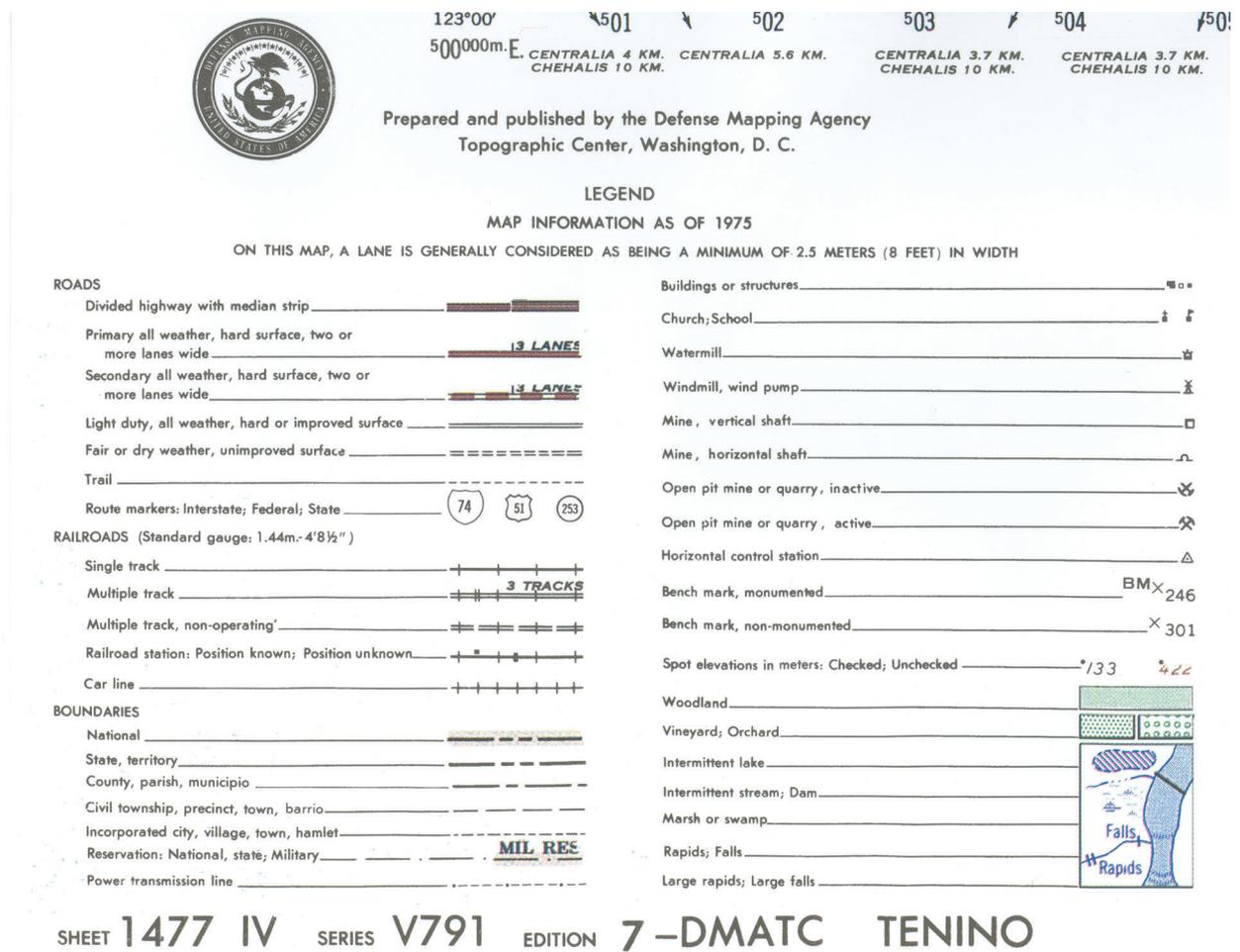


Figure 1.2 Map Legend

declination

the angular difference between any two linear depictions of direction

true north

a line from any point on the earth's surface to the North Pole

grid north

the north that is established using the vertical grid lines on a map

magnetic north

the direction to the north magnetic pole, as indicated by the north-seeking needle of a magnetic instrument, such as a compass

G-M angle

the angular distance between grid north and magnetic north

The lower right margin shows you the *adjoining map sheets* diagram. Your map sheet will be at the center of the diagram, which gives you the sheet numbers of the maps adjoining yours.

The *notes* tell you the means the mapmakers have used to determine map distances and the agencies responsible for the map information.

The **declination** diagram tells you how to convert magnetic azimuths from your compass to grid azimuths to use on your map—and vice versa. The diagram shows you the differences between **true north**, **grid north**, and **magnetic north**. It also lists the grid-to-magnetic angle (G-M angle) in degrees. You must understand this **G-M angle**, which is the difference between grid north and magnetic north. The closer to the poles you go, the greater this angle becomes. You must also know how to convert your compass's magnetic azimuth to your map's grid azimuth (and vice versa). You'll learn more about azimuths in the next section.

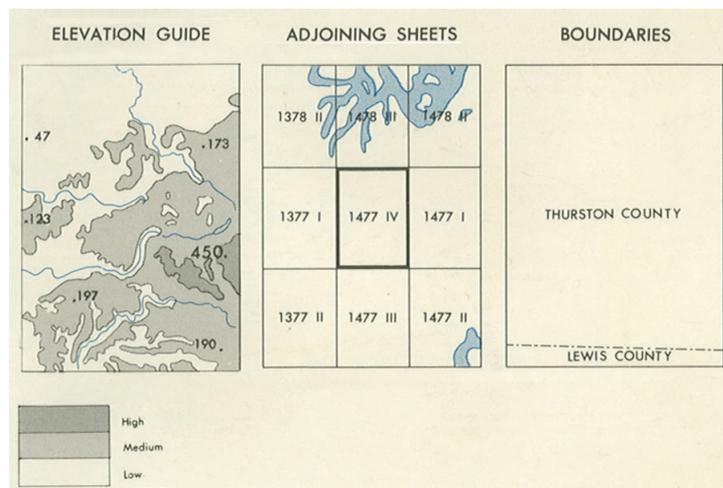


Figure 1.3 Adjoining Sheets Diagram

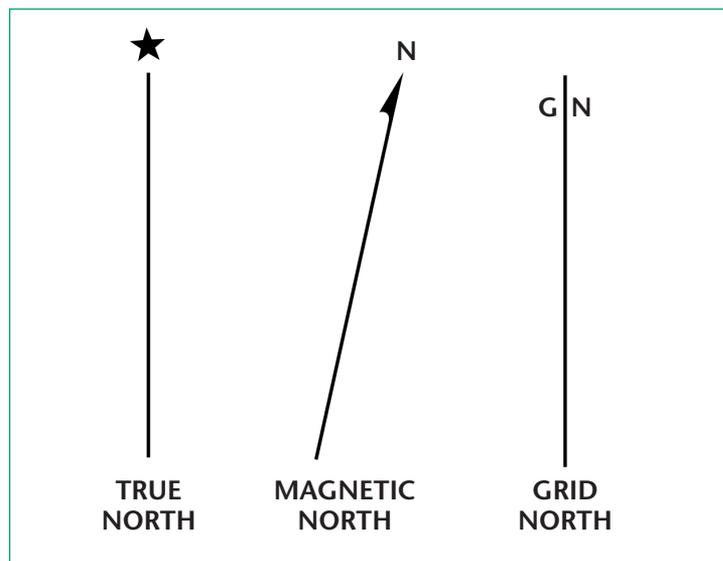


Figure 1.4 The Three Norths

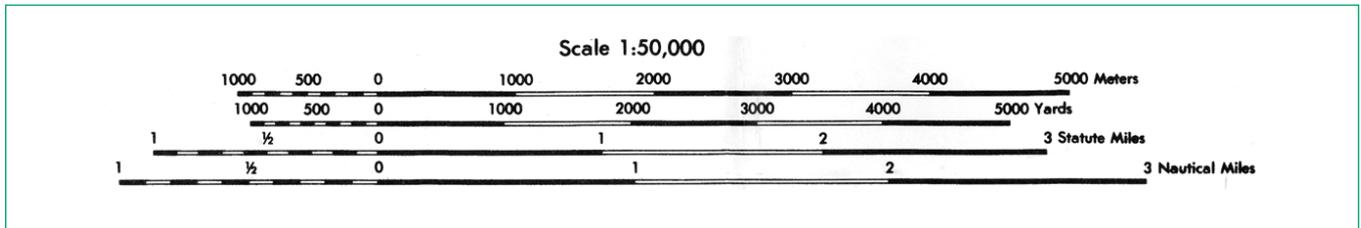


Figure 1.5 Map Scale

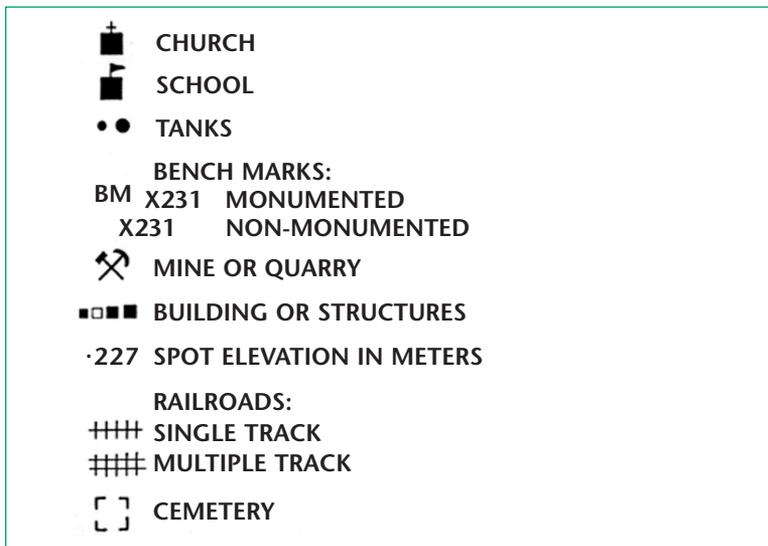


Figure 1.6 Topographic Symbols

Most maps work with the metric system. A 1,000-meter grid square is 1,000 meters by 1,000 meters, or a kilometer square. Soldier jargon for a kilometer, or 1,000 meters, of distance on a map is a “click.” (“According to the map, it’s 16 clicks to the objective.”)

The **scale** gives you the ratio of the distance on the map to the distance on the ground. For example, a scale of 1:50,000 indicates that one unit of measure on the map—an inch, for example—equals 50,000 units of the same measure—inches, in our example—on the ground. The larger the number after the colon, the less detail; the smaller the number after the colon, the more detail.

The *contour interval* gives you the vertical distance—in feet or meters—between contour lines. The contour lines and the contour interval will tell you how steep or how flat a piece of ground is.

The *grid reference* gives you the 100,000-meter-square reference for your map. Mapmakers have divided the world into 60 grids with letter-and-number (alpha-numeric) designators called *grid zone designators*. You will need this information to communicate a location to others.

The *glossary* explains the map’s technical terms or translates the map’s foreign-language terms.

The **topographic symbols** on the map represent natural and man-made features. Figure 1.6 shows some common topographic symbols used on military maps. *Never* assume, however, that all maps use the same topographic symbols—*always* check the legend.

scale

the ratio of the map distance to the corresponding distance on the earth’s surface

topographic symbols

symbols on a map that represent natural and man-made features found on the earth’s surface

Identifying Colors on a Military Map

Mapmakers use color to show subtle differences on the map. Familiarize yourself with these seven colors (or color combinations) and what they represent:

1. *Black* represents buildings, railroads, and roads
2. *Red and brown* combinations may represent constructed features (such as major roads), relief features, and contour lines
3. *Blue* represents the water in rivers, lakes, swamps, and coastlines
4. *Green* represents the vegetation in woods, orchards, and vineyards
5. *Brown* represents relief features and elevation such as contour lines on older maps and cultivated land on newer ones
6. *Red* represents populated areas, main roads, and boundaries on older maps
7. *Other colors* may represent special information. Check the legend.

Using Contour Lines to Determine Elevation

Three types of contour lines on the map will help you determine the elevation of your present location, your intended location, or your objective.

1. Every fifth contour line is a heavier *index* contour line. Index contour lines will have numbers that represent the elevation of the line.
2. The contour lines between the index lines are *intermediate* contour lines. These lines are finer and do not have elevation numbers. Four intermediate lines usually separate index lines.
3. *Supplementary* contour lines are dashed lines. They show elevation changes of at least one-half the contour interval. Supplementary lines appear on fairly level terrain where the elevation changes in small increments.

Use the contour interval measurement in the marginal information to determine the contour interval and the unit of measure—feet, meters, or yards. Then take the following steps to determine a location's elevation:

To maintain operational security and your night vision, you will use a red-lens flashlight when conducting operations during limited visibility. Older maps printed major roads and built-up areas in a red ink that "disappeared" in red-filtered light. Mapmakers have recognized the problem and now print military maps with a red-brown ink color that is red-light readable.

Be aware of how the seasons and climate may affect how much water there is in an intermittent water source. Maps will display intermittent water sources as blue, but no water may be there at the time you are navigating, or the source could be swollen and impassable if the area received a lot of rain.

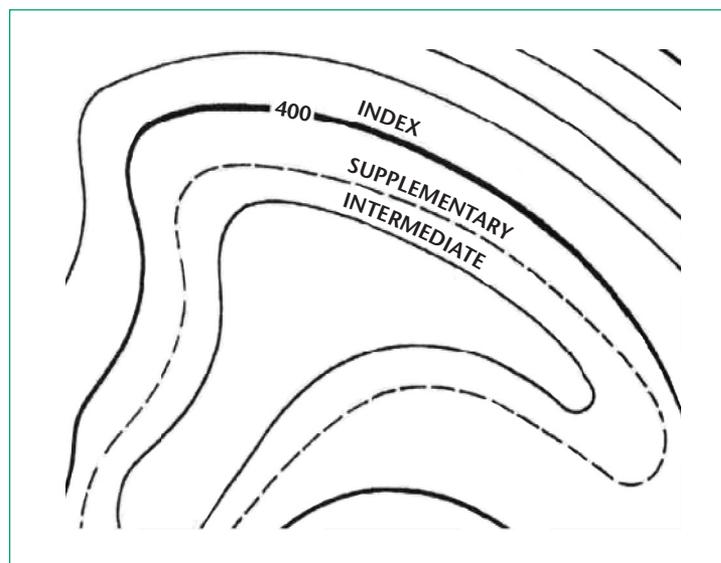


Figure 1.7 Contour Lines

1. Find the numbered index contour line nearest the point for which you are trying to determine the elevation. Determine if your point is a higher or lower elevation from the closest index contour line. For example, in Figure 1.8, if you are at Point A the closest index contour line is 500 meters, which means any point on that line is 500 meters above sea level. The elevation of the next highest index contour line is 600, or 600 meters above sea level. Going from the lower-numbered index contour line to the higher-numbered index contour line shows that your point (Point A) is at a higher elevation than 500 meters.
2. Determine the elevation of Point A by starting at the index contour line numbered 500 and counting the number of intermediate contour lines (the unmarked contour lines) to Point A.
3. Point A is on the second intermediate contour line above the 500-meter index contour line. Since the contour interval is 20 meters, each intermediate contour line you cross to get to Point A adds 20 meters to the 500-meter index contour line. So the elevation of Point A is 540 meters. You can also find your elevation by subtracting the number of contour lines from the higher elevation line of 600 meters, if you prefer.
4. To continue your practice you can determine the elevation of Point B by locating the nearest index contour line. In this case, it is the upper index contour line numbered 600. Point B is located on the intermediate contour line immediately below the 600-meter index contour line. (*Below* in this context means downhill or a lower elevation.) Therefore, Point B is located at an elevation of 580 meters.
5. As in the previous example with Point A, you could also have started at the 500-meter index line and counted up four intermediate lines to arrive at the same correct elevation for Point B, 580 meters.
6. You can determine the elevation of the hilltop, Point C, by adding one-half of the contour interval to the elevation of the last contour line. In this example, the last contour line before the hilltop is an index contour line numbered 600. Add one-half the contour interval, 10 meters, to the index contour line. The elevation of the hilltop would be 610 meters.

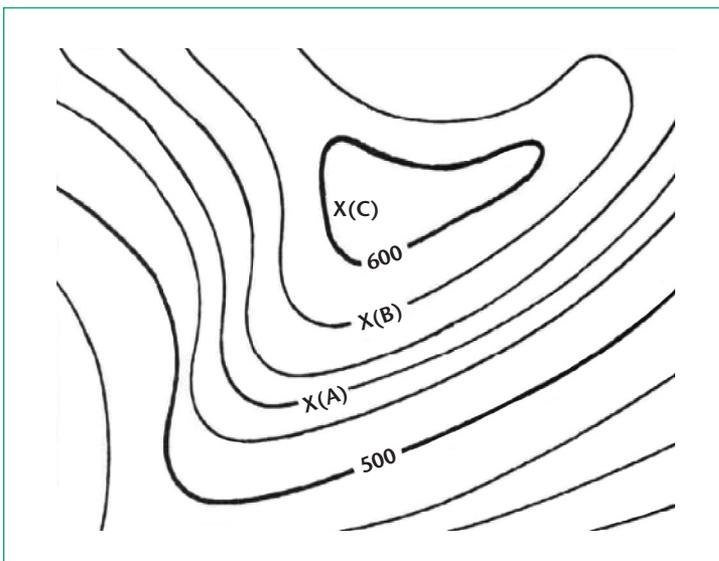


Figure 1.8 Points on Contour Lines

Slope

The rate of rise or fall of a terrain feature is known as its *slope*. At times you will need to know the *gradient* of a slope, or the “rise overrun”: How difficult will the slope be for your Soldiers to climb? Can you drive a Humvee up it? The gradient tells you how steep the slope is between two points.

To calculate a slope’s gradient, find the elevation of Point A and of Point B (Figure 1.9). Then determine the vertical distance between the two by subtracting the elevation of Point A from that of Point B. The difference (210 meters) is the vertical distance between the two points.

Now measure the horizontal distance by taking a piece of paper, laying it on the map, and making a tick mark at each point. Then line up the paper with your map scale. In Figure 1.10, the horizontal distance is 3,000 meters. Divide the vertical distance (VD) by the horizontal distance (HD), and reduce the numerator to 1. This gives you a slope gradient of 210/3,000 or 1/14.3—about one meter of rise for every 14 meters of horizontal distance.

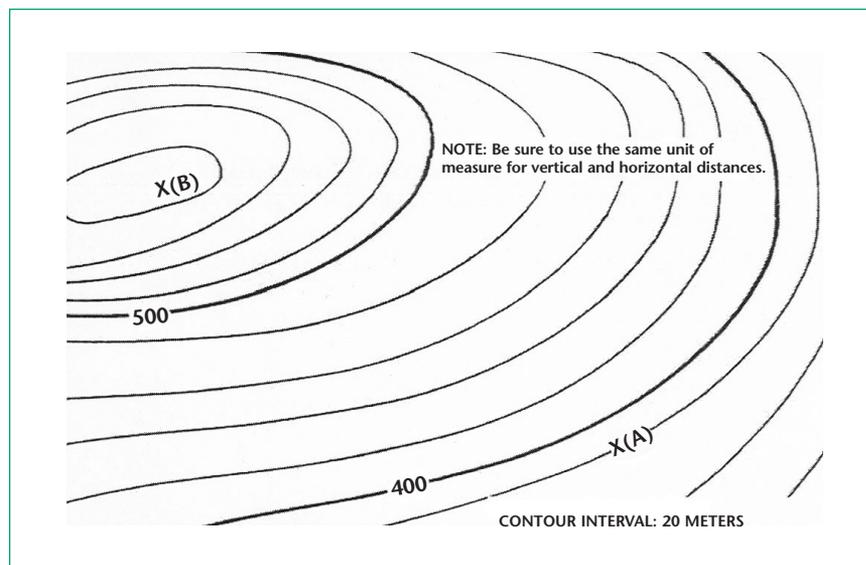


Figure 1.9 Contour Lines Around a Slope

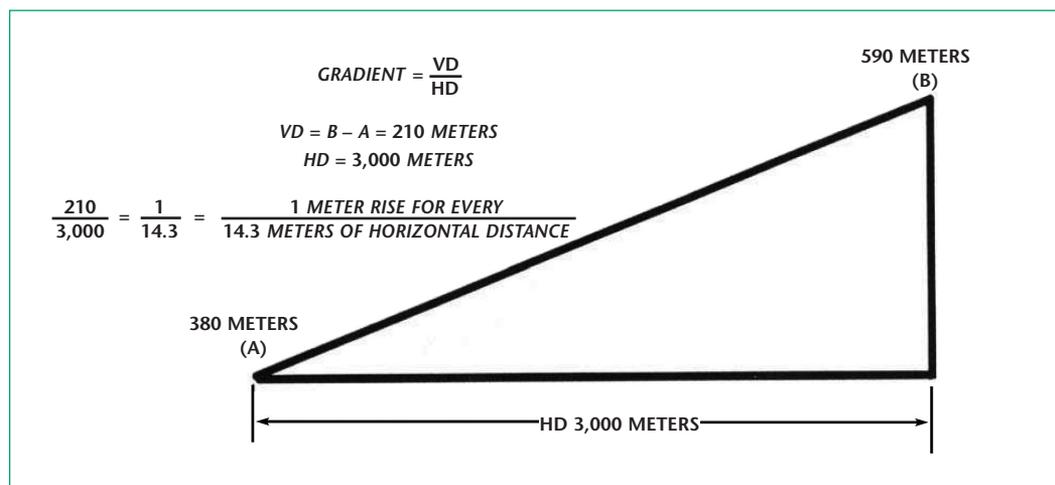


Figure 1.10 Gradient

Identifying Terrain Features

Whenever you are outside, look around and consider the different types of land you see. You will probably see some **terrain features**: the hills, valleys, and other features on the ground. Your map's contour lines give you important information about these features and their locations.

Major terrain features include hills, saddles, valleys, ridges, and depressions.

1. A *hill* is an area of high ground. If you stand on a hilltop, the ground slopes away from you in all directions. A map represents a hill with contour lines forming concentric circles. The inside of the smallest circle is the hilltop (Figure 1.11).
2. A *saddle* is a dip or a low point between two areas of higher ground. If you stand in a saddle, you have high ground in two opposite directions and lower ground in the other two directions. The contour lines on a map representing a saddle are shaped like an hourglass (Figure 1.12).

terrain features

characteristics of the land, such as hills, ridges, valleys, saddles, and depressions

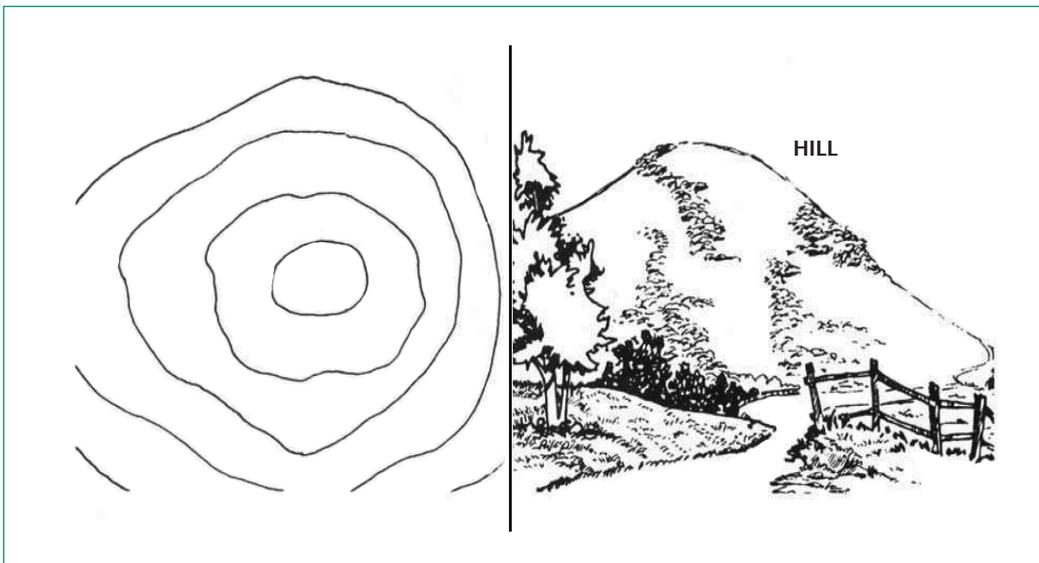


Figure 1.11 Hill

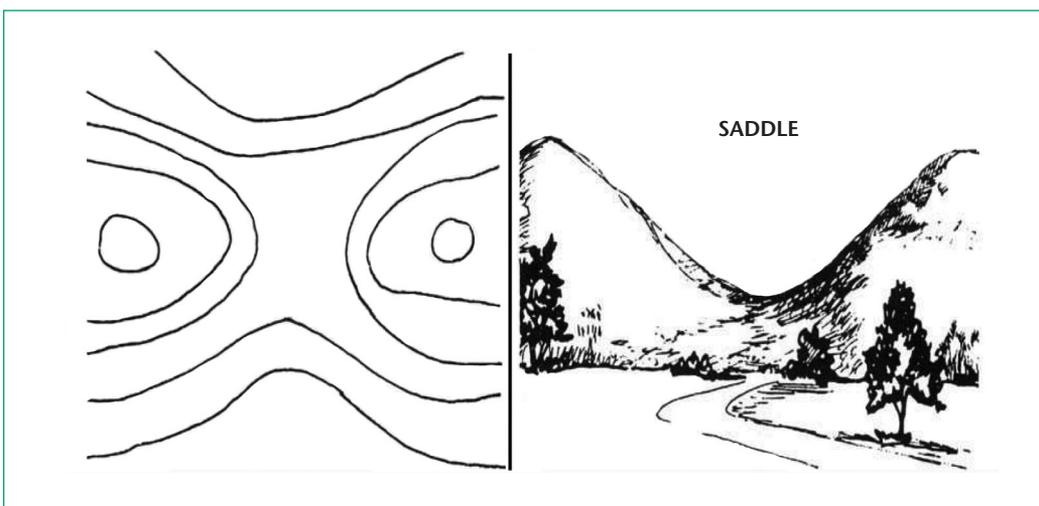


Figure 1.12 Saddle

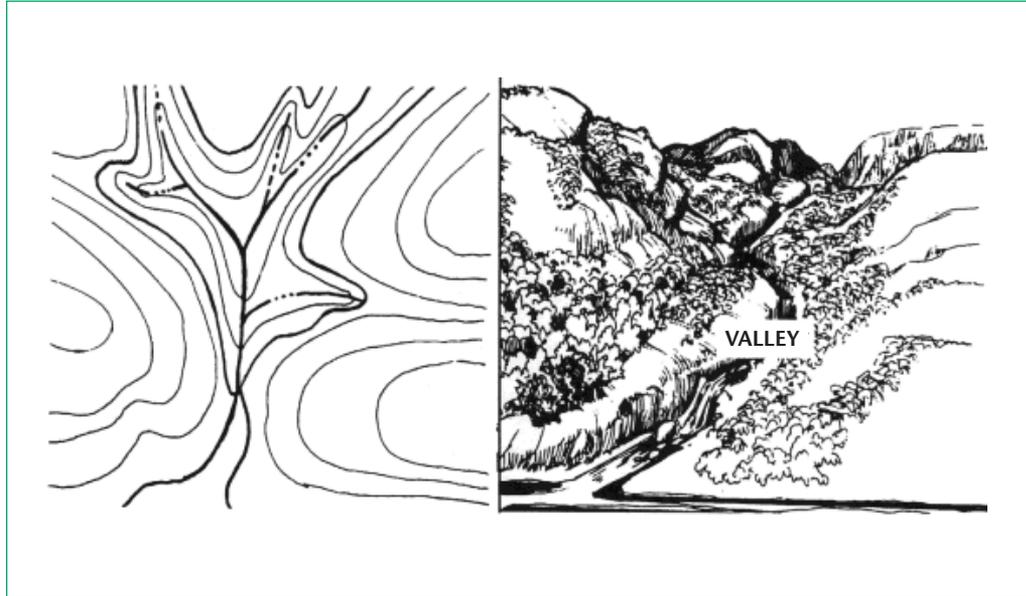


Figure 1.13 Valley

3. A *valley* is a large open area with high ground on three sides and a course of running water through it, usually a large stream or river. If you stand in a valley, you will have higher ground in three directions and lower ground in one direction. Depending on the size of the valley and where you are standing, you may not see the higher ground in the third direction, but the stream or the river will flow from higher to lower ground. The contour lines for a valley on a map resemble the letter U or V, with the high ground being the sides of the U or V and the stream or river running in the center of the U- or V-shaped contour lines. Look at the contour lines to determine the direction the stream or the river flows. The closed end of the contour lines (the U or the V) points upstream and toward higher ground (Figure 1.13).
4. A *ridge* is a sloping line of high ground. Think of a ridge as the high ground that runs along a hill. A series of connected hills forms a ridgeline. If you stand on the centerline of a ridge, you will normally have low ground in three directions and high ground in one direction. If you cross a ridge, you will climb to the crest and descend to the base. A map represents a ridge with U-shaped or V-shaped contour lines, but unlike a valley, the closed end of the contour lines point to lower ground. A ridge can be easily confused with a spur (Figure 1.17). The difference is that a spur will generally run perpendicular to a ridge or ridgeline, while a ridge will run directly off a hill or a series of hills (Figure 1.14).
5. A *depression* is a sinkhole or a low point in the ground. Think of a depression as an upside-down hill. If you stand in the center of a depression, you will have higher ground in all directions. A map represents a depression with contour lines forming concentric circles; tick marks point to the lower ground (Figure 1.15).

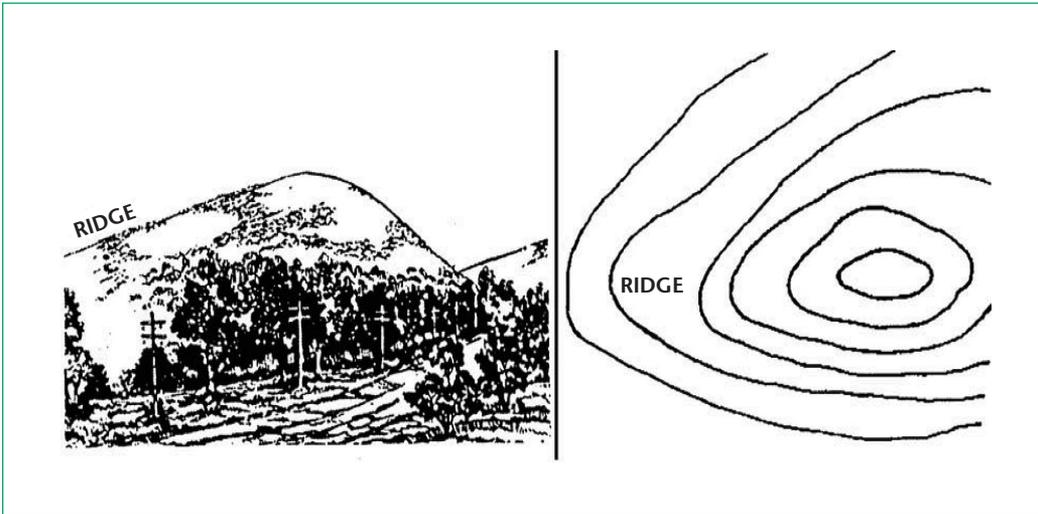


Figure 1.14 Ridge

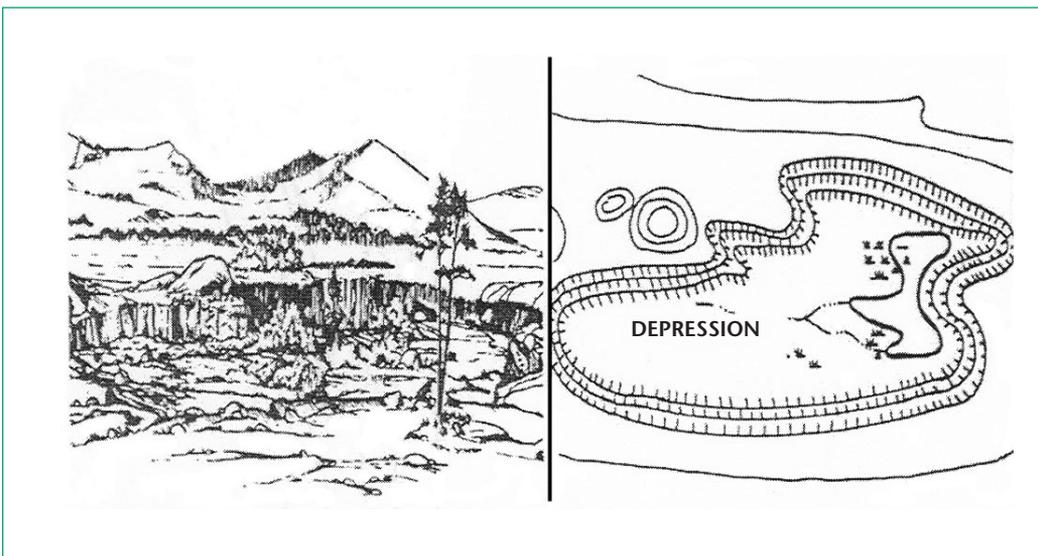


Figure 1.15 Depression

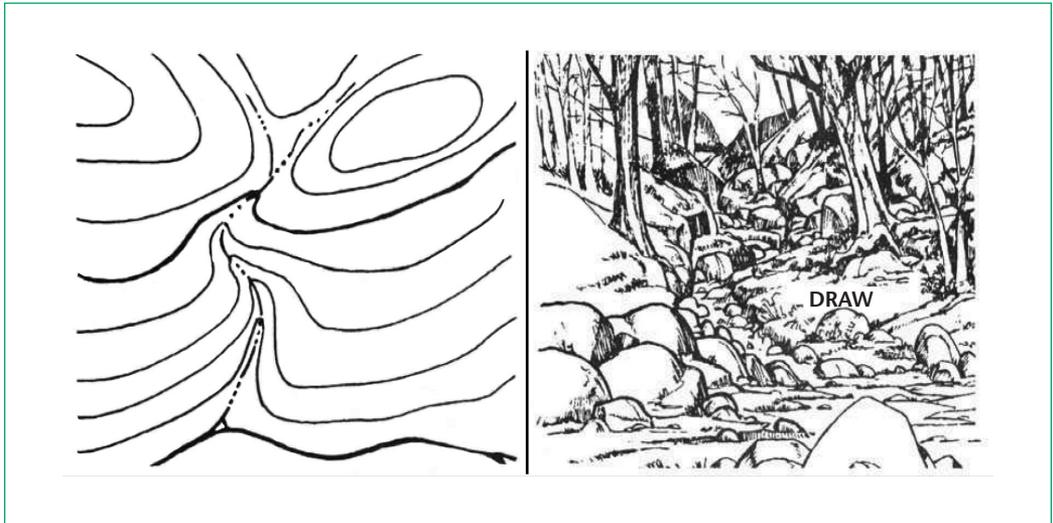


Figure 1.16 Draw

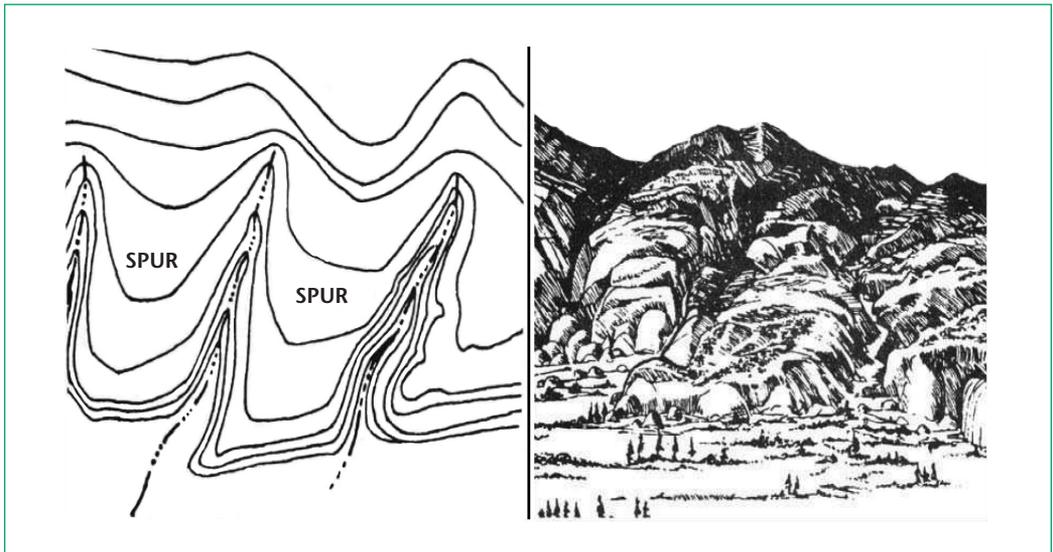


Figure 1.17 Spur

The contour lines of a valley and a draw look very similar on a map. From a military point of view, a valley gives you some room to maneuver troops and equipment, while a draw may only have enough space for a squad or platoon to maneuver in.

Minor terrain features include draws, spurs, and cliffs.

1. A *draw* is a small valley. A draw has essentially no level ground and little or no maneuver room. If you are standing in a draw, the ground slopes upward in three directions and downward in the remaining direction. You could consider a draw to be the initial formation of a valley. A valley will usually have many draws feeding to the valley with streams or intermittent streams feeding into the body of water flowing through the valley. On a map, the contour lines depicting a draw are sharply V-shaped, pointing to higher ground (Figure 1.16). In most cases, a draw will be situated to the left or right of a spur or lying between two spurs.
2. A *spur* is a short ridge. The ground will slope downward in three directions and upward in one direction. On a map, the contour lines depicting a spur are U-shaped pointing away from higher ground (Figure 1.17). In most cases, a draw will be situated to the left or right of a spur or lying between two spurs.

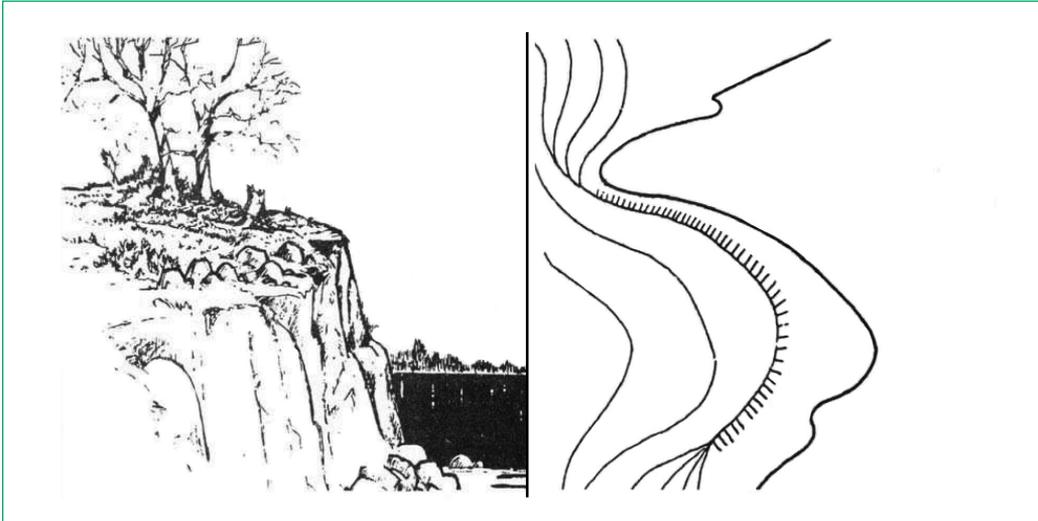


Figure 1.18 Cliff

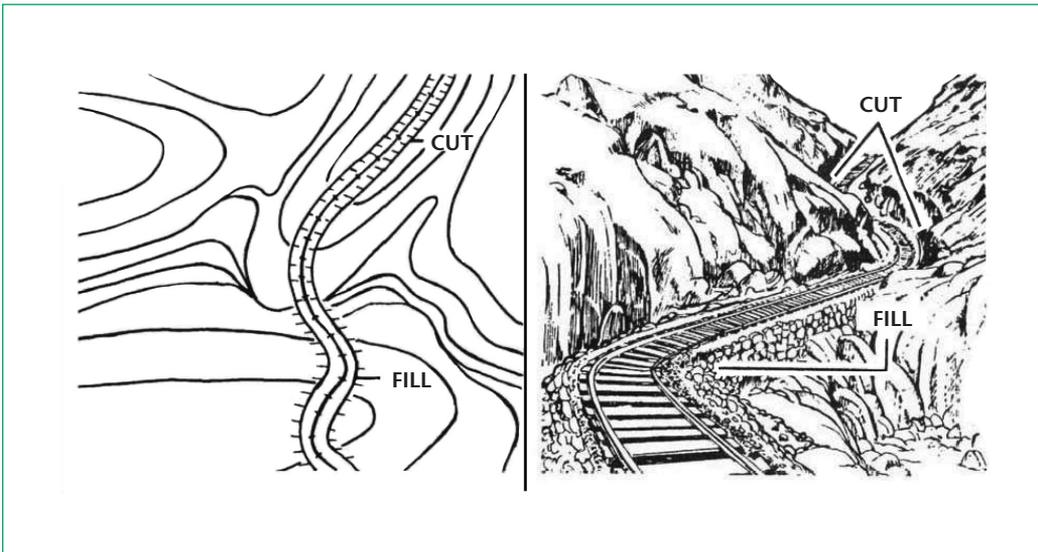


Figure 1.19 Cut and Fill

3. A *cliff* is a vertical or near-vertical feature. On a map, the contour lines for cliffs are nearly touching, or the contour lines come together to form one contour line depicting the edge of the cliff. Newer maps may also depict a cliff with the same type of tick marks used in depicting a depression, with the tick lines facing downward, representing the vertical face of the cliff (Figure 1.18).

Supplementary terrain features include cuts and fills (Figure 1.19).

1. A *cut* is a man-made feature that cuts through raised ground. You may see a cut on a map forming a level bed for a road or railroad track.
2. A *fill* is a man-made feature that fills a low area. Again, you may see a fill on a map forming a level bed for a road or railroad track.

Using Four-, Six-, and Eight-Digit Grid Coordinates to Determine a Location

grid coordinates

letter and number designations that allow you to locate a point on a map

To determine a location on a map, you will need two pieces of information:

1. The *grid zone designator* and the 100,000-meter-square identification from the grid reference box.
2. The **grid coordinates** of your location. Four-digit coordinates will give you a location with an accuracy of within a 1,000-meter-square area. A six-digit coordinate will increase the accuracy of your location to within a 100-meter-square area. An eight-digit coordinate will further increase your accuracy to a location within a 10-meter-square area. Ten-digit grid coordinates will place your location within a one-meter-square area. You use 10-digit grid coordinates when accuracy is extremely important, such as when marking minefields, graves on the battlefield, or the last known locations of killed in action or missing in action not recovered. As you can see, the larger the number of coordinates you use, the more precisely you can determine your location.

Using Your Protractor

Your protractor will allow you to determine grid coordinates more easily and accurately. The Army protractor is Graphic Training Aid (GTA) 5-2-12, 1981 (Figure 1.20). It has four major parts:

1. A cross-hair in the middle that is made up of the index and horizontal and vertical baselines (Figure 1.20). You will use the index to plot the center to locations on the map and the horizontal and vertical baselines to align your protractor to the grid lines on your map and increase your accuracy when determining azimuths.
2. Three scales—1:100,000; 1:50,000; and 1:25,000—that you will use to match the scale of your map and determine the grid coordinates of your location.
3. An inner scale of 360 degrees that you will use to plot azimuths.
4. An outer scale of 6,400 mils you will use to call for indirect fire.

Note: A circle has 360 degrees or 6,400 mils.

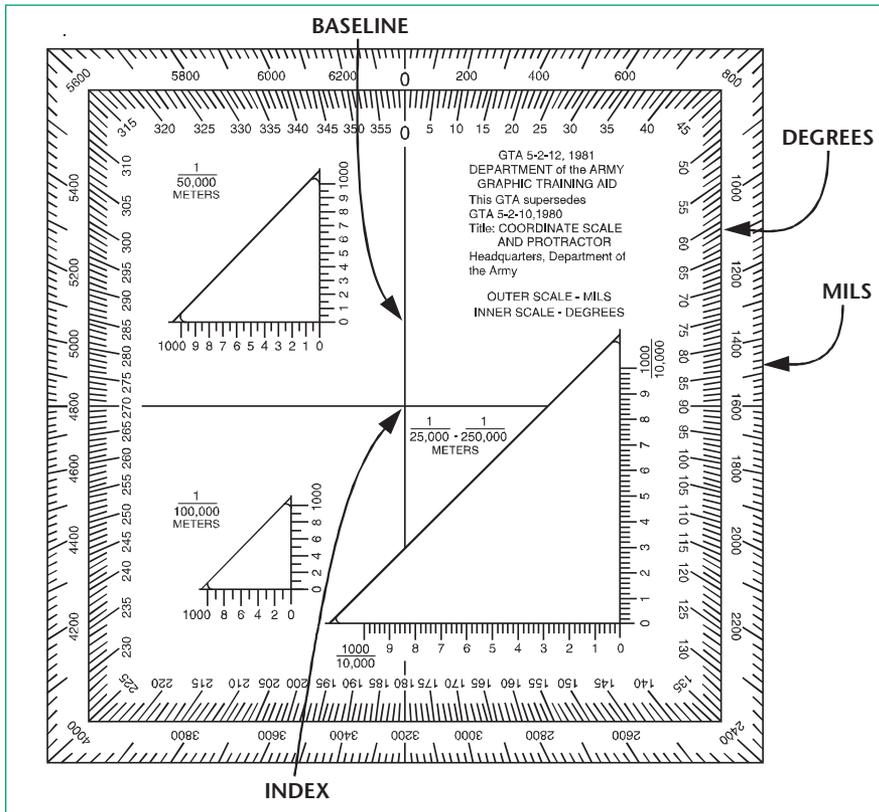


Figure 1.20 Army Protractor (GTA 5-2-12, 1981)

Using Four-Digit Grid Coordinates to Determine a Location

Mapmakers have divided the earth's surface into 60 grid zones. Each of these grid sections has a unique identification called the *grid zone designator*. The grid zone designator for your Tenino map is 10T, while the grid zone designator for a map that includes Ft. Benning, Ga., is 16S. Mapmakers then divide each zone into 100,000-meter squares, which they identify using a combination of two alphabetical letters. You will find these letters in the grid reference box in the map's lower margin. Figure 1.21 shows an example of two grid zone designators and the 100,000-meter-square letter identifications for each of the grid zone designators. Each two-letter designator—for example 16SGL, which also includes Ft. Benning—represents an area 100,000 meters by 100,000 meters.

Only aviators usually need to navigate over areas as large as 100,000-meter squares. Cadets and Soldiers usually operate in much smaller areas, and they can identify objects on the map through grids represented by four-, six-, and eight-digit grids.

Every set of grid coordinates will have an even set of numbers. In a four-digit grid, the first half of the grid coordinate numbers represents the horizontal, “left-to-right,” or “easting” reading. The second half of the grid coordinate numbers represents the vertical, “bottom-to-top,” or “northing” reading. For example, grid coordinate 16SGL0182 would represent the entire 1,000-meter square highlighted in color. The first two numbers (01) represent the easting reading (left to right from the vertical 01 line) and the second two numbers (82) represent the northing reading (up from the 82 line).

The *critical* rule is to read *right* from the easting or vertical line, and *up* from the northing or horizontal line. Notice how the example reads *right* and *up*: Grid square 0182 was to the *right* of line 01 and above—*up* from—line 82.

Remember the cardinal rule of map reading: Read right and up.

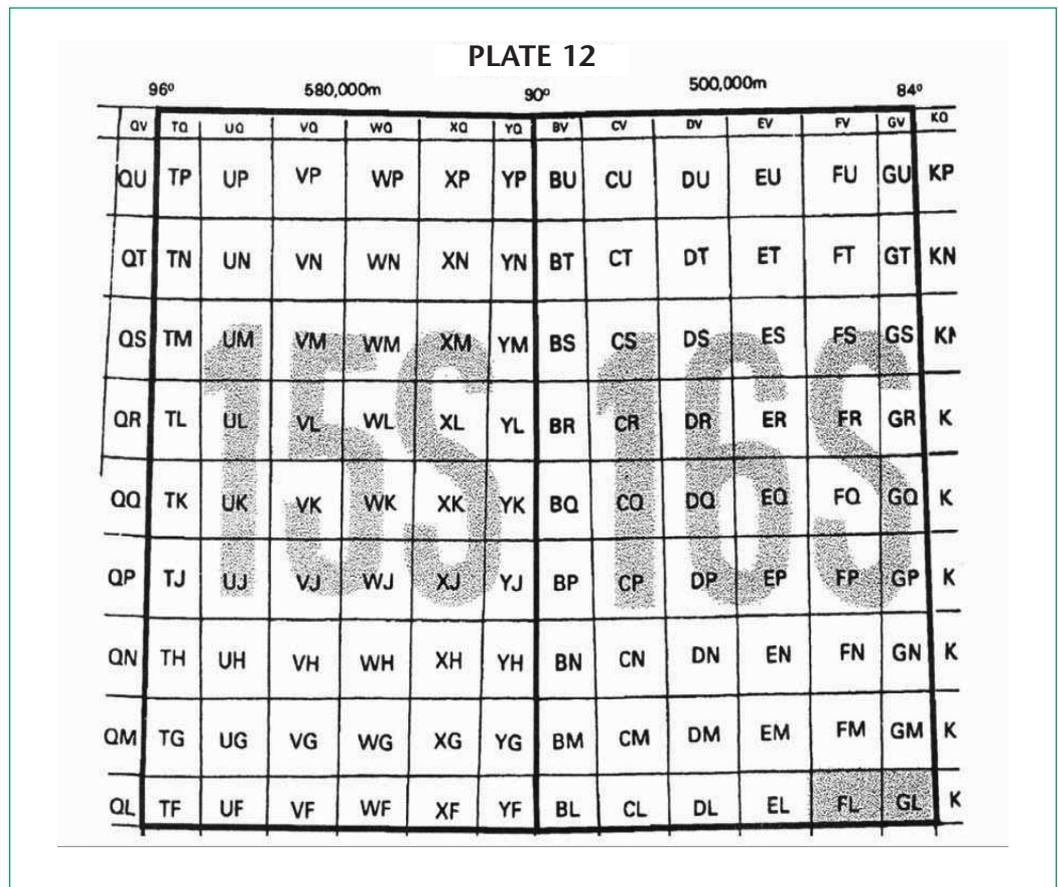


Figure 1.21 Grid Zone Designation and 100,000-Meter-Square Identification

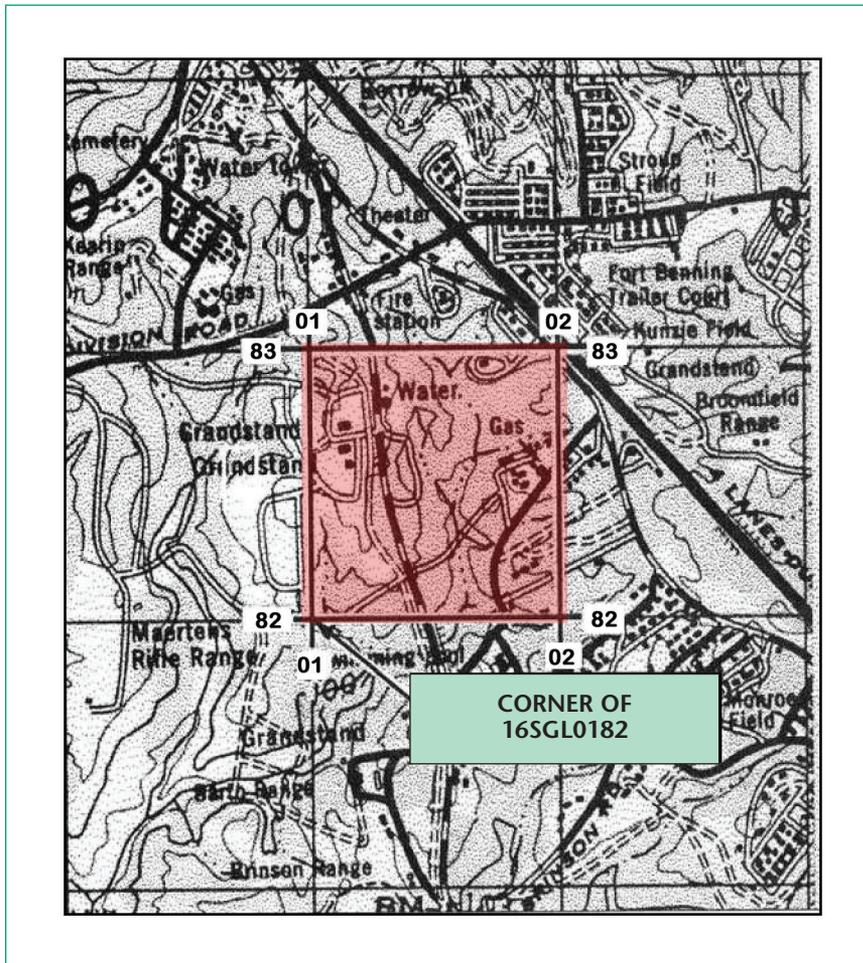


Figure 1.22 Four-Digit or 1,000-Meter Grid Square on a Map of Fort Benning, Ga.

Now consider for a moment that you are trying to call in a helicopter for a MEDEVAC (medical evacuation) of a wounded Soldier. You can't just give the pilot, "Rotor 3, this is Scorpion 22, my location is Sixteen-Sierra, Golf Lima," because this would give your MEDEVAC a 100,000-meter square in which to search for you—it would be like finding a needle in a haystack. Instead, you may start out with, "Rotor 3, my location is at Sixteen-Sierra, Golf Lima, Zero One, Eight Two (Figure 1.22)." This would allow the pilot to fly within a 1,000-meter square, or one grid square, to find you. But the pilot will need an even more precise target to find you in time to save your injured Soldier.

The Phonetic Alphabet

The phonetic alphabet is used to spell out letters in place of just saying the letter itself. By using a word for each letter, there is less chance that the person listening will confuse letters. For instance, two letters that can easily be confused are “D” and “B.” When a speaker uses the phonetic alphabet, a listener can easily distinguish between “Delta” and “Bravo.” The phonetic alphabet is used primarily in two-way radio communications. Using the phonetic alphabet reduces the effects of noise, weak signals, distorted audio, and radio operator accent. Maritime units, aircraft, amateur radio operators, and the military around the world use this system of spelling letters.

Phonetic Alphabet

Letter	Pronunciation	Letter	Pronunciation
A	Alpha (AL fah)	N	November (no VEM ber)
B	Bravo (BRAH VOH)	O	Oscar (OSS cah)
C	Charlie (CHAR lee)	P	Papa (pah PAH)
D	Delta (DELL tah)	Q	Quebec (keh BECK)
E	Echo (ECK oh)	R	Romeo (ROW me oh)
F	Foxtrot (FOKS trot)	S	Sierra (see AIR rah)
G	Golf (GOLF)	T	Tango (TANG go)
H	Hotel (hoh TELL)	U	Uniform (YOU nee form)
I	India (IN dee ah)	V	Victor (VIK tah)
J	Juliet (JEW lee ETT)	W	Whiskey (WISS key)
K	Kilo (KEY loh)	X	X Ray (ECKS RAY)
L	Lima (LEE mah)	Y	Yankee (YANG key)
M	Mike (MIKE)	Z	Zulu (ZOO loo)

NOTE: Stress the syllables printed in capital letters.

Using Six-Digit Grid Coordinates to Determine a Location

For the MEDEVAC chopper to find you quickly, you’ll need to give the pilot a six-digit grid coordinate, which will allow the pilot to look for you within a 100-meter square of your location, which in most cases will place the helicopter where you can see it. To determine a six-digit grid coordinate, use these five steps:

1. Make sure you are using the appropriate scale (check the scale in the map’s marginal information) and make sure the scale is right side up.
2. Place the protractor scale with the zero-zero point at the lower left corner of the appropriate grid square.

3. Keep the horizontal line of the protractor's scale directly on top of the horizontal, left-to-right, or "easting" grid line, and slide the protractor—and its scale—to the right until the left vertical line of the grid square touches the point on the protractor scale for the coordinate you want.
4. Read up the vertical scale until you reach the coordinate you want.
5. Mark the location.

Now you can tell the MEDEVAC pilot where you are within 100 meters. You radio the helicopter: "Rotor 3, this is Scorpion 22. I am at grid Sixteen-Sierra, Golf Lima, Zero-One-Two, Eight-Two-Eight (Figure 1.23). The chopper arrives, finds you, and evacuates your wounded Soldier, who survives—because you knew how to read a map and figure coordinates. (Often MEDEVAC and other units operate within the same grid zone designator. If this is the case, it is common to drop that portion of the radio transmission.)

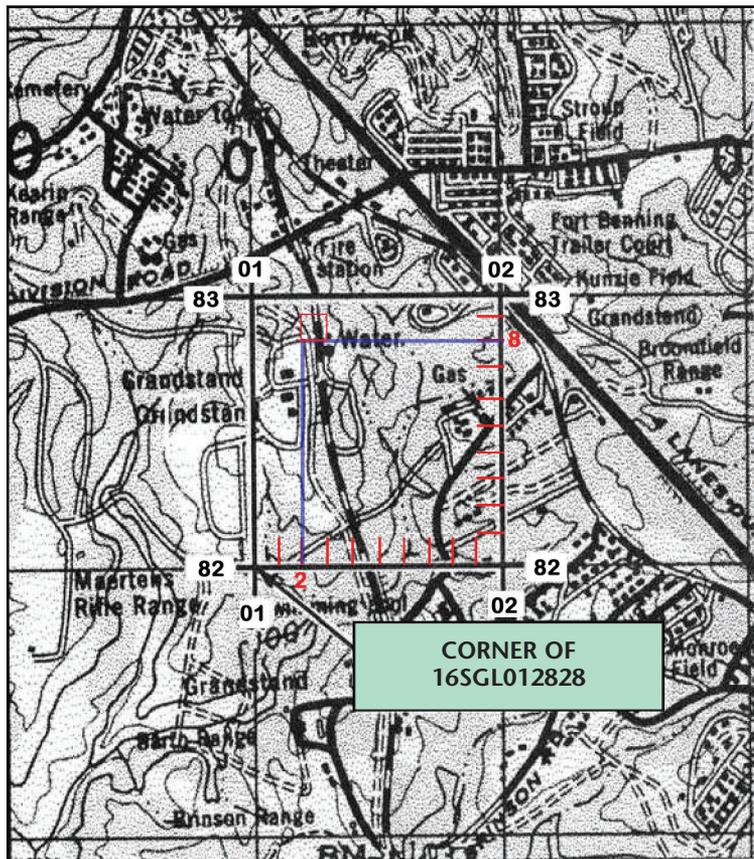


Figure 1.23 Six-Digit or 100-Meter Grid Square on a Map of Fort Benning, Ga.

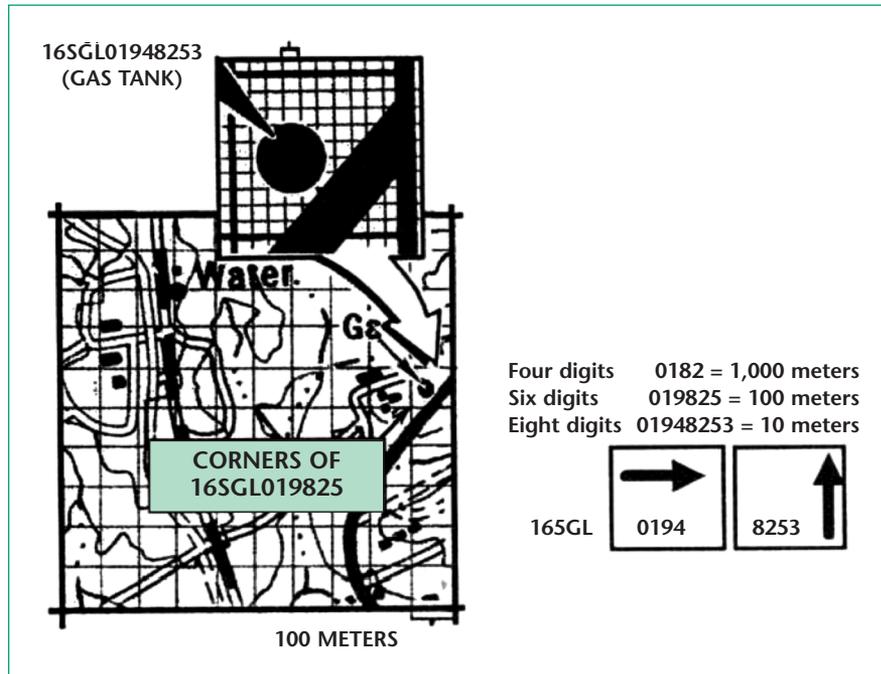


Figure 1.24 Coordinate Location Within 10 Meters Using Grid Coordinate Scale

Using Eight-Digit Grid Coordinates to Determine a Location

You can be even more precise than a six-digit grid, if necessary. You can determine your location to within 10 meters if you have a 1:25,000 or a 1:50,000 scale map.

Follow these five steps to identify a 10-meter square. The steps are identical to the six-digit steps with one exception in the third step:

1. Make sure you are using the appropriate scale (check the map scale in the marginal information) and make sure the scale is right-side up.
2. Place the protractor scale with the zero-zero point at the lower left corner of the appropriate grid square.
3. Keep the horizontal line of the protractor's scale directly on top of the horizontal, left-to-right, or "easting" grid line, and slide the protractor—and its scale—to the right until the left vertical line of the grid square touches the point on the protractor scale for the coordinate you want. *Use the lines of the 1:25,000 or 1:50,000 scale protractor to estimate the fourth and eighth digits of your coordinates.*
4. Read up the vertical scale until you reach the coordinate you want.
5. Mark the location.

Make sure the horizontal line of the protractor's scale is lined up with the horizontal, left-to-right, or "easting" grid line, and the vertical line of the scale is parallel with the vertical, bottom-to-top, "northing" grid line.

Remember, the precision of a point's location is shown by the number of digits in the coordinates—the more digits, the more precise the location.

Be very careful not to misidentify or transpose the numbers. As the scenario on pages 199–200 illustrates, your life—and your Soldiers' lives—may depend on the accuracy of your grid coordinates.



Critical Thinking

What activities or needs might require an eight-digit coordinate?
A six-digit coordinate? A four-digit coordinate?



CONCLUSION

You will never lose your need to read a map. Now is the time to develop, polish, and perfect your map-reading skills. Your success in mastering these skills will determine your success as an ROTC Cadet and, later, as an Army lieutenant. But more than that—map-reading skills will be crucial to your platoon's success in future missions and to your survival on the battlefield.

Key Words

legend

declination

true north

grid north

magnetic north

G-M angle

scale

topographic symbols

terrain features

grid coordinates

Learning Assessment

1. Describe and explain in your own words the five major terrain features of hill, valley, saddle, ridge, and depression.
2. Explain the difference between a draw and a valley; and between a spur and a ridge.
3. List some man-made and natural objects depicted on a military map by topographical symbols.
4. Explain how to determine the gradient of a slope.
5. Explain why a six-digit grid coordinate is more precise than a four-digit grid coordinate.

6. Explain how to determine a four-digit grid location of an object on a military map.
7. Explain how to determine a six-digit grid location of an object on a military map.
8. Explain how to determine an eight-digit grid location of an object on a military map.
9. Describe how to plot a four-digit grid coordinate on a military map.
10. Describe how to plot a six-digit grid coordinate on a military map.
11. Describe how to plot an eight-digit grid coordinate on a military map.

References

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