

***GTA 05-02-013**

How To Find Your Way



Purpose: This graphic training aid (GTA) explains and illustrates the fundamentals of map reading. The information conforms as closely as possible to approved Department of the Army (DA) doctrine and is intended to complement existing training literature. Refer to Field Manual (FM) 3-25.26 for more information.

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INTRODUCTION

When you get lost in combat, you may encounter the enemy, fail your mission, and have trouble getting back to your unit. To avoid getting lost, use—

- A map.
- A compass.
- Other ways to find directions.
- Common sense.

You will learn what you need to know about military maps and direction finding so that you can move about with confidence without getting lost. A map is nothing more than a drawing of a section of the earth's surface as you would see it if looking straight down from an airplane.

Maps show man-made objects, such as roads, buildings, and bridges. All of these man-made objects are represented by a symbol. The symbols are explained in the legend, located at the lower left-hand corner of every map (Figure 1).

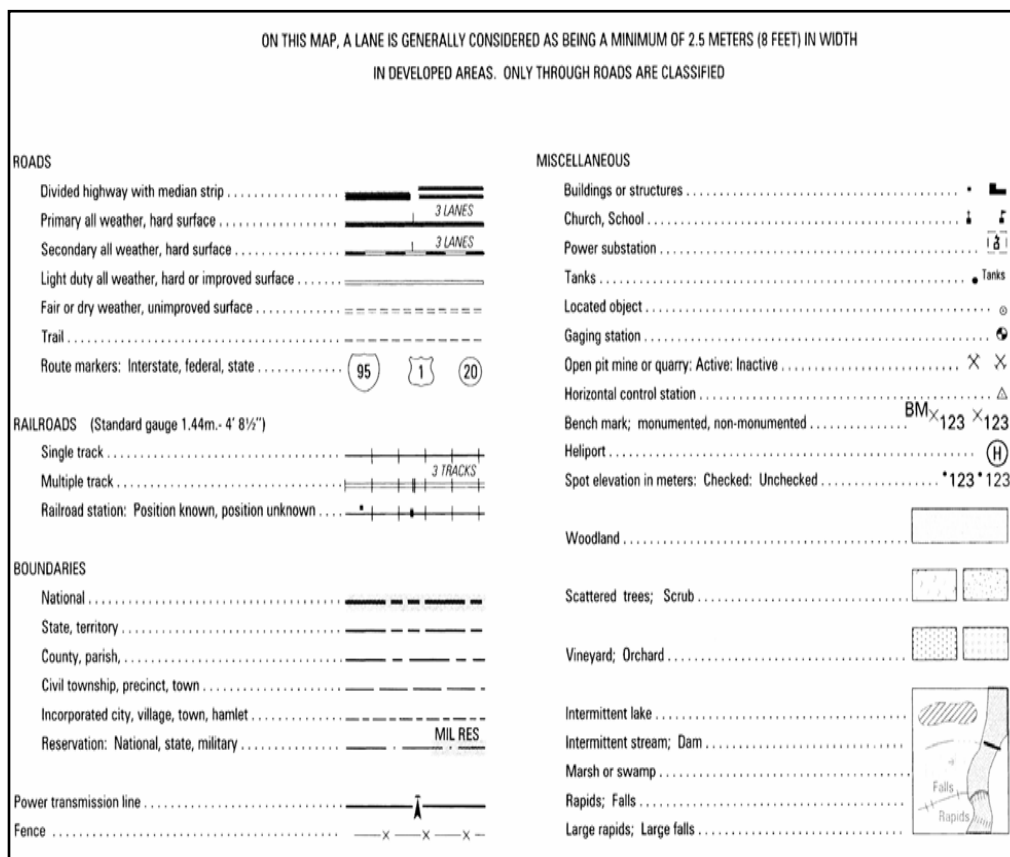


Figure 1. Sample Map Legend



Besides giving symbols for man-made objects, the legend gives the color coding used on the map and explains the meaning of other symbols, which gives you a better idea of what the ground actually looks like. Always look at the legend before using your map.

FINDING YOUR LOCATION

To avoid getting lost, you have to know how to find your location. There are no street addresses in a combat area. However, by using a military map, you can find your location without difficulty. Maps have black lines running up and down (north and south) and crosswise (east and west). These lines form small squares called "grid squares" that are numbered along the outside edge of the map picture. Using these numbers, you can identify each grid square.

No two squares have the same number. To get the right numbers for a certain grid square, read from left to right along the bottom and locate the line that borders the grid square on the left. Then read up, and find the east-west line that borders the grid square along the bottom (Figure 2).

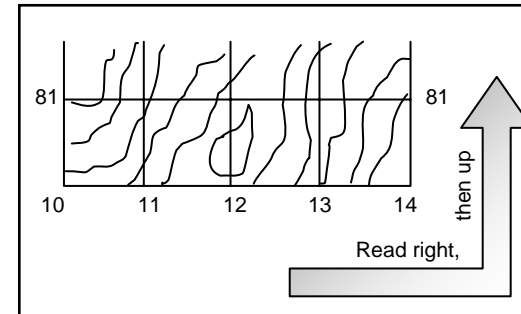


Figure 2. Map Grid Squares

Figure 3 shows your location as grid square 1181. How do you know this? Start from the left and read right until you come to 11, and then read up to 81. Your location is somewhere in the grid square of 1181. Remember to read from left to right, then up.

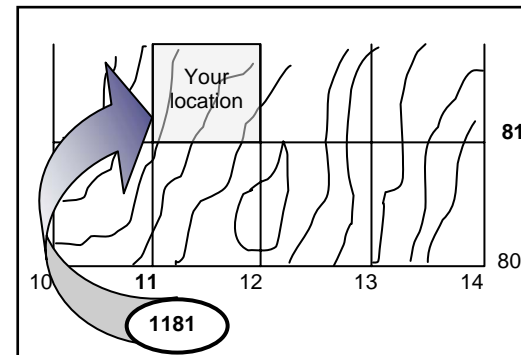


Figure 3. Grid-Square Location

Grid square 1181 gives your general location, but there is a lot of area inside that grid square. To make your location even more accurate, you will need to add another number to the first half and another to the last half.

To get these numbers, imagine that each grid square has ten lines inside it running north and south, and another ten lines running east and west. This makes 100 small squares (Figure 4). You can estimate where these imaginary lines are.



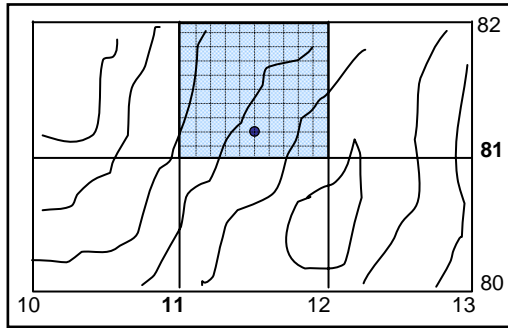


Figure 4. Grid-Square Coordinates

If you are exactly halfway between line 11 and line 12, your first added number is 5 and the first half of your location is 115. And suppose that you are also two tenths of the way between line 81 and line 82. Then the second half of the number is 812. If you were exactly on line 81, the second half would be 810.

Figure 4 shows that if you were located where the dot is in grid square 1181, your location would be 115812. These six numbers are called your "coordinates." They give your location, and if you always know your coordinates, you can never be lost.

If you have GTA 05-02-012 (Figure 5), you do not have to worry about estimating where you are inside a certain grid square or use imaginary lines. You can determine your exact coordinates.

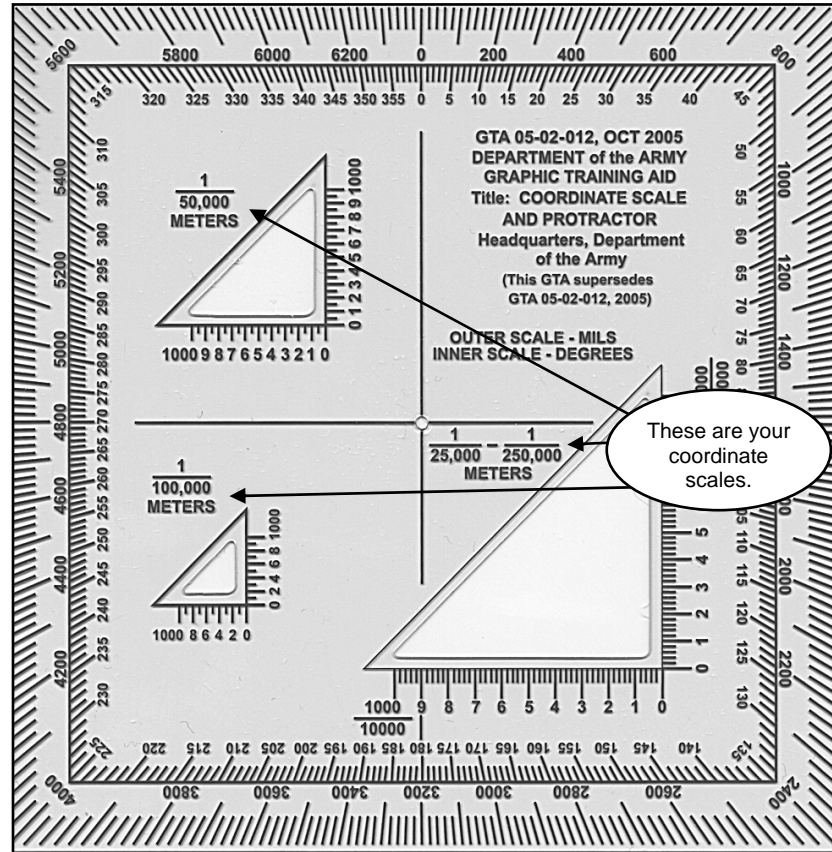


Figure 5. Coordinate Scale and Protractor

The coordinate scale and protractor is a square piece of clear, thin plastic—called a "protractor" for short. The protractor helps to measure small distances inside grid squares. You can also measure angles with it. You will learn more about measuring angles later. Your squad leader can show you exactly how to use the protractor.

DETERMINING THE DISTANCE

You can use your map to measure the distance between two places, because maps are drawn to scale. This means that a certain distance on the map equals a certain distance on the earth. This scale is printed at the bottom and top of a map (for example, *Scale 1:50,000*). This signifies that 1 inch on the map equals 50,000 inches on the ground. Any ground distance equals 50,000 times that distance on the map.

NOTE: Always check the scale on your map before trying to measure distance, because different maps have different scales.

Two methods used to determine distance are the—graphic (bar) scale method and the pacing method.

Graphic (Bar) Scale Method

There are three different bar scales at the bottom of your map. Use these scales to help convert the map distance into miles, meters, or yards. To figure the distance on the ground using the graphic (bar) scale method, take the edge of a piece of paper and put a tick mark on it at the straight-line distance between your two points (Figure 6). Then put the paper beneath one of the bar scales and read the ground distance in miles, meters, or yards. For example, the estimated ground distance on the bar scale between the marks in Figure 6 is about 3,950 meters.

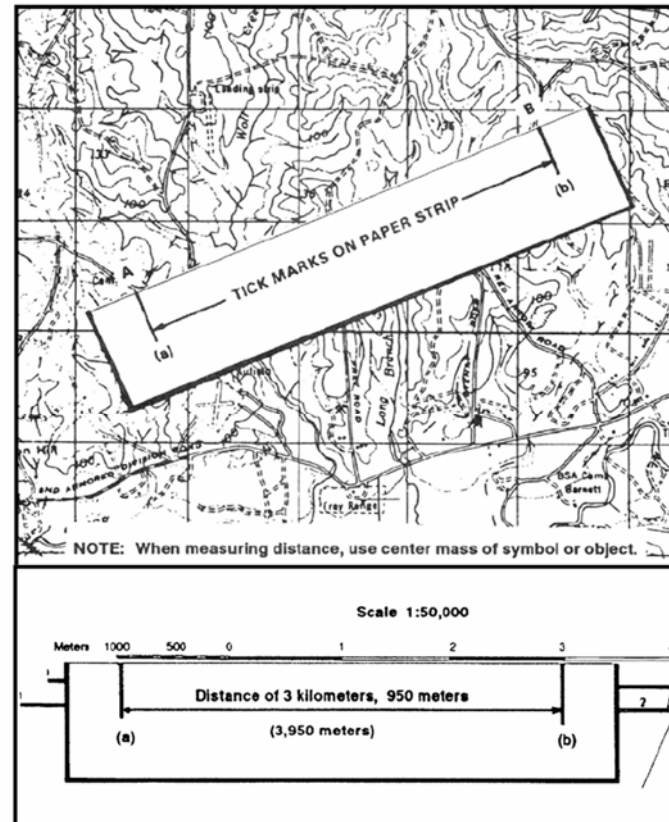


Figure 6. Finding Straight-Line Distance Using Bar Scales

Suppose you want to find the distance between point A and point B around a curve in a road (Figure 7). Take a strip of paper, make a small tick mark on it, and line up the tick mark with point A. Align the paper with the road's edge until you come to a curve, make another tick mark on the paper and on the map, then pivot the paper so it continues along the road's edge. Repeat this until you get to point B, always following along the road's edge with your paper. Make a mark on your paper at point B, then go to the bar scales to find the distance.

Pacing Method

When you have to go a certain distance on foot without any landmarks to guide you, you can measure distance pretty accurately by counting your paces. The average pace is just a little less than 1 meter. The average person uses 116 paces to travel 100 meters.

NOTE: If you do not take 116 paces for 100 meters, determine how many paces you do take by pacing yourself on a known 100-meter distance.

When traveling cross-country, as you do in the field, you will use more paces to travel 100 meters—usually about 148 instead of 116. This is because you are not traveling over level ground and must use more paces to make up for your movement up and down hills. Pace yourself over at least 600 meters of cross-country terrain in order to learn how many paces it takes you to travel an average 100 meters. Be sure you know how many paces it takes you to walk 100 meters on both level and cross-country terrain.

The big problem with pacing is maintaining a straight line. At night, the average person tends to walk in a circle when not using a compass. During the day, you should use a compass and steering points (well-defined objects in your direction of travel). Also, remember to figure only the straight-line distance when you have to walk around an obstacle.

Another problem with pacing is keeping count of the paces that you have taken. One way to keep count is to use pebbles. For instance, suppose you want to pace off 1 kilometer (1 kilometer is 1,000 meters or the distance between two of the black grid lines on your map). Put 10 pebbles in your right pocket. When you go 100 meters, move one pebble to your left pocket and start your count over.

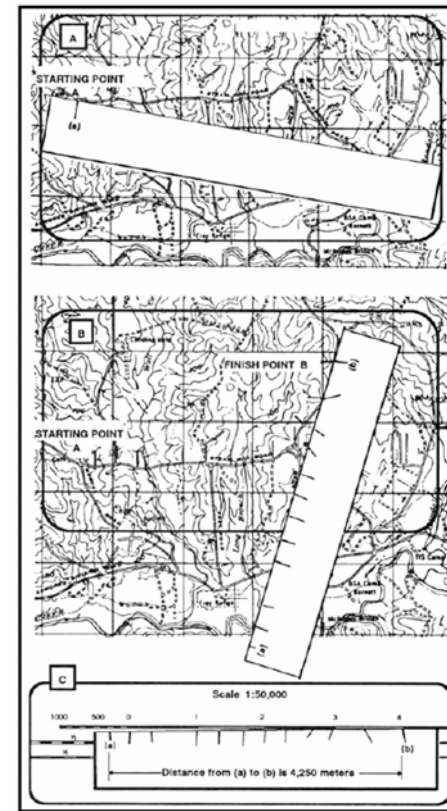


Figure 7. Finding Distance Around Curves Using Bar Scales

When all 10 pebbles have been moved to your left pocket, you have traveled 1 kilometer. Another way to keep count is by tying knots in a string—one knot per 100 kilometers.

FINDING THE CORRECT DIRECTION

You have learned how to find your location (map coordinates) and how you can use the map scale to determine the distance. The next step is to find the correct direction. Knowing how to find these three things will keep you from getting lost.

Azimuth

The top of the map is north, the right is east, the bottom is south, and the left is west. The direction from one point to another point (either on the map or on the ground) is called an azimuth.

Azimuths are given in degrees in a clockwise direction. Since there are 360° in a circle, your azimuth can be any number up to 360°. Due east is 90°, due south is 180°, due west is 270°, and due north is 360° (Figure 8).

To get the right azimuth from a map, you have to use a protractor. If your coordinate is 220850 and you want to find the azimuth to a certain road junction, draw a line from your location to the road junction. Then place the protractor as shown in Figure 9.

Be sure to line it up properly, keeping the cross-center lines of the protractor parallel with the grid lines. The azimuth as shown by the protractor is 223°. Suppose you follow the 223° azimuth to the road junction, and then you want to go back to your original location. To do this, you must take a back azimuth. Simply subtract 180° from the first azimuth ($223^\circ - 180^\circ = 43^\circ$).

If your first azimuth is too small to subtract 180°, just add 180°. For example, if your azimuth was 40°, you know that you cannot

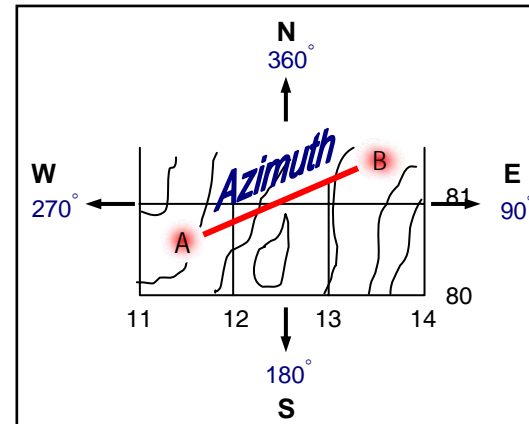


Figure 8. Azimuth

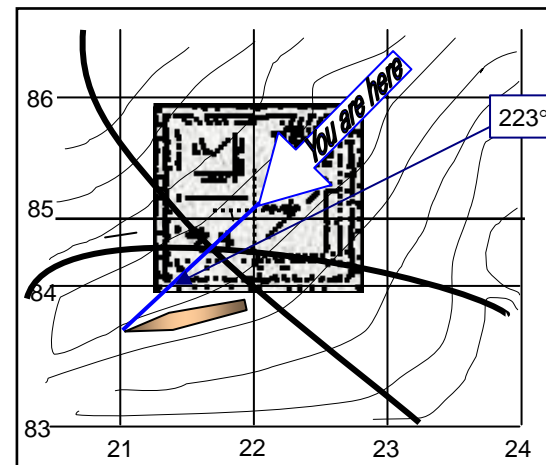


Figure 9. Finding Azimuths With a Protractor



subtract 180° from it, so add 180° ($40^\circ + 180^\circ = 220^\circ$). Remember, a back azimuth goes in the opposite direction from the azimuth.

CAUTION

When converting azimuths to back azimuths, use extreme care when adding or subtracting the 180° . A simple mathematical mistake could have disastrous consequences.

North

The north-south lines on a map give grid north. The compass needle points to magnetic north. Grid north and magnetic north usually have a few degrees difference. Neither points straight at the North Pole—that is called "true north." However, it is not necessary to know where true north is to avoid getting lost in a combat area.

The difference in degrees for every map between grid north and magnetic north is shown at the bottom of the map (Figure 10). This difference is called the "G-M angle" (Figure 11). The diagram at the bottom of newer maps shows how to change grid azimuths to magnetic azimuths and magnetic azimuths to grid azimuths.

For example, you aim your compass at a distant tower and get a compass reading of 190° (Figure 12). This is called a magnetic azimuth. The diagram on the map shows that the G-M angle is 2° . To convert the magnetic azimuth to a grid azimuth, add the G-M angle of 2° to the compass reading of 190° . This gives you a grid azimuth of 192° . Most of the time, the G-M angle is so small that you do not have to be concerned with it. It depends on what region of the world you are in. Your squad leader will tell you if the G-M angle in your area is large enough to be concerned with.

