

MACCABBEE BUSHCRAFT



Land Navigation Course

LESSON 4 DETERMINING YOUR LOCATION & USING DEAD RECKONING

Learning Objectives:

- 4-1. Understand how to locate your position when you have lost your orientation and how to find your location on a map using land features.
- 4-2. Understand how to use a two point resections.
- 4-3. Understand how to use a one-point resection.
- 4-4. Understand how to identify the five steps for navigating using terrain association.
- 4-5. Understanding the term dead reckoning
- 4-6. Identify how to navigate using dead reckoning

4-1 Understand how to locate your position when you have lost your orientation and how to find your location on a map using land features:

Getting lost or merely moving along to your destination and forgetting your pace count can happen easily, if one is not maintaining his or her awareness to what he or she is doing. Also, you could lose your focus on the map features located in the area you plotted and or moving toward. Or you could have merely ventured off course away from your initial course or trail. So how can we figure out where we are located now? In a night time scenario, which we will discuss in the section concerning night time navigating, it could become very complicated since visibility is extremely limited.

4-2. Understand how to use a two point resections:

Here we are going to learn how to plot a two point intersection or also called a resection. Basically what we are going to do is make two degree readings, or separate azimuths each one aimed separate apart from each other. And we will do so by taking a forward azimuth as well as their back azimuths. Once we have these two azimuths we will plot them on our map, and the point in which they intersect each other is where we are located.

The first step is to orientate your map so that your compass and map are positioned facing north, which means we will need to make sure our compass is oriented to read grid north. In doing so you can look all around in each and every direction surrounding you in order to get an idea of your terrain and land features you have before you, in order to choose which objects are suited for making these two plotting points. Once you have done this find two land features which are at least 30 degrees to 150 degrees apart, but no greater than 150 degrees. Then take a reading of both land features and right down their degree reading as well as their back azimuth for each one. Then triangulate them and the point in which both angles bisect is your location. In doing this you will be able to relocate in general the area you are on your map.

Order of Operations:

- 1) Make sure your compass is converted over to read grid north using the declination chart or GMA (Grid Magnetic Angle) located on your map, once this is accomplished move on to the next order of operations.

- 2) Using the map and the terrain around you line up the terrain features so that you have a general alignment. Then Place the map flat on the ground and take the flat edge of the compass and place it along the north grid lines found on the map and turn the map till the compass reads north now you have orientated your map. Locate the land features you have found visibly on the map, once this is accomplished move on to the next order of operations.

- 3) Leave your map as is and now convert your compass back to magnetic north and move on to step 4

- 4) Take the two land features you found which are opposite of each other and make sure they are at least 30 degrees part (but do not exceed 150 degrees in distance keep the range of 30 degrees to 150 degrees). Take down these two readings of both their forward and back azimuths and write them down on a note pad.

- 5) Now convert your compass back to grid north and with your protractor mark these points on the map and with a ruler draw the respective back azimuths from these two points on your map.

- 6) Extend the azimuths lines from these two points until they intersect. You are now located at the point of intersection where these two lines cross one another. (see fig 4.1 for detailed diagram)

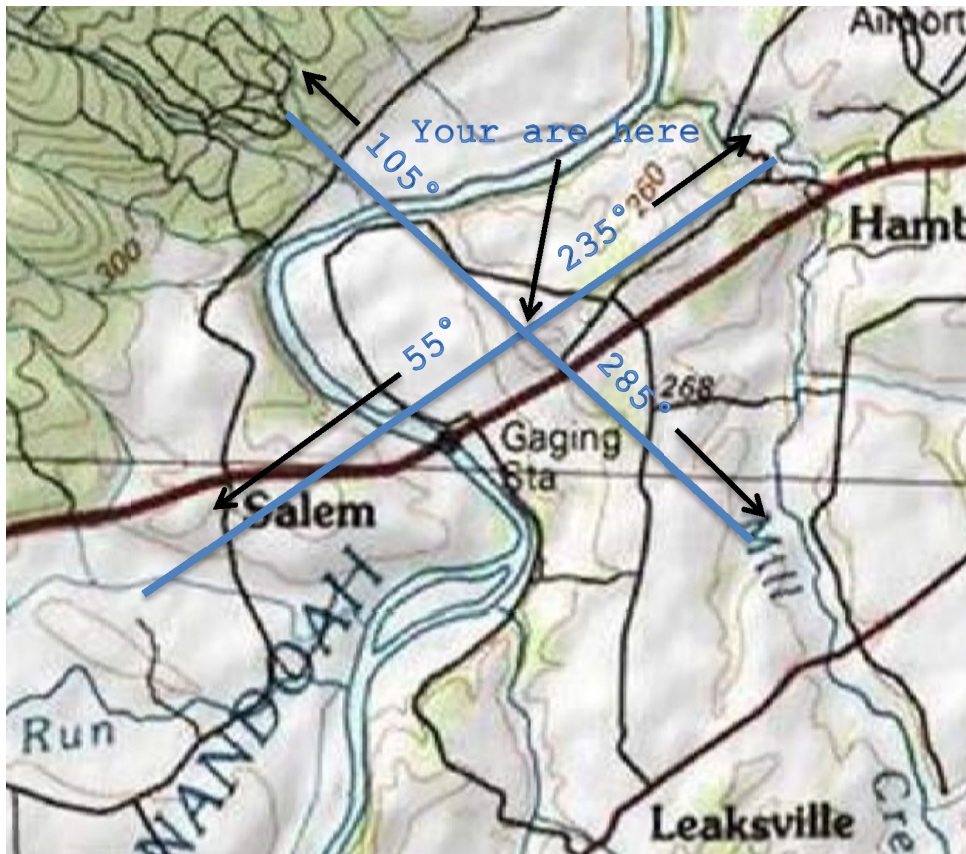


Fig 4.1

4-3. Understand how to use a one point resections:

Now there is another way of doing this as well, but unlike taking two readings we will only need one, by using only one degree reading and its 180 degree back azimuth. However, in order to do this we must have a clear understanding of our land features surrounding us, and we will need to have a clear understanding of what is before us and what's behind us. In this case we will know what key markers are in our path of sight. Thus, say for instance I was on a road but on my right I could see the top of a mountain and on my far right almost about 90 degrees I could see another mountain top. But I am not quite sure where on the road I am. By shooting an azimuth toward the first mountain top (using your sight aperture on your compass and the compass to cheek technique while creating a magnetic azimuth) I get 139°. If I take the back azimuth of 319° (then convert the magnetic to grid north now using the map) and draw a line connecting the degree front and back I will find my location is here on the road. As seen on the next page.

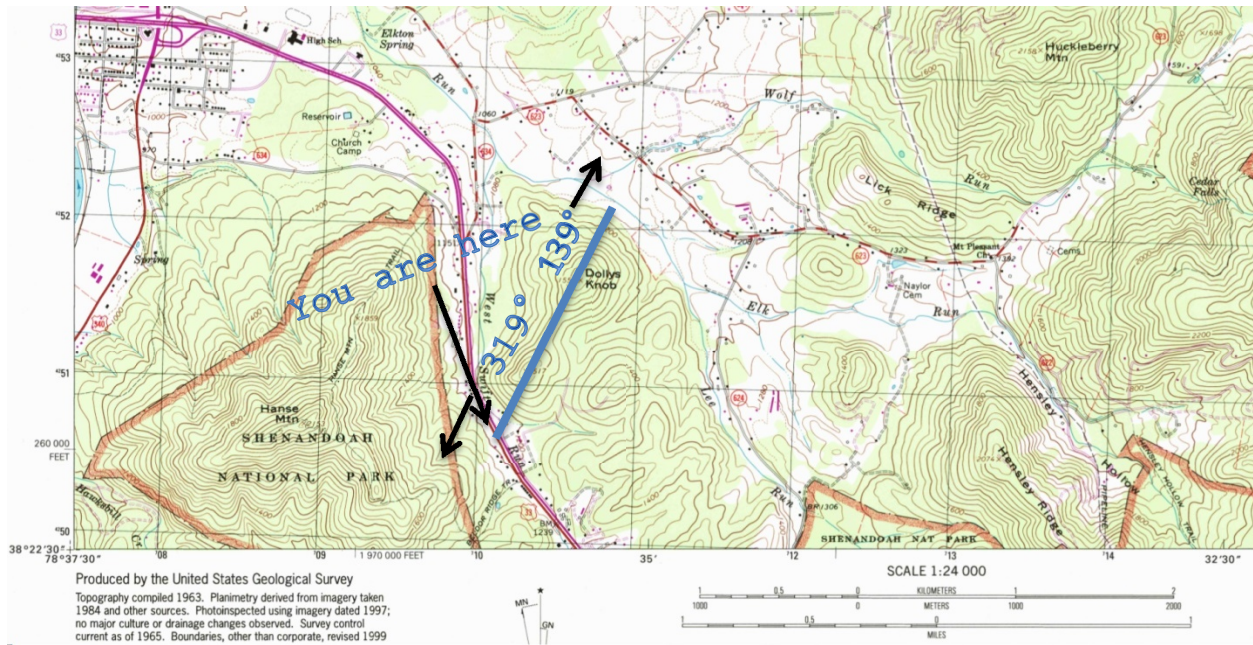


Fig 4.2

A good rule of thumb is to never use a land feature in the direction which is parallel to you always use a reading which is perpendicular to you as it will make it hard to ascertain your position/location.



Fig 4.3

Order of Operations:

- 1) Make sure your compass is converted over to read grid north using the declination chart or GMA (Grid Magnetic Angle) located on your map, once this is accomplished move on to the next order of operations.
- 2) Place the map flat on the ground the flat edge of the compass along the north grid lines and turn the map till the compass reads north now you have orientated your map. Locate the land feature which is perpendicular to you and find it visibly on the map.
- 3) Convert your compass back to magnetic north and move on to step 4
- 4) Take the land feature you found which is perpendicular to you and a forward and reverse azimuth. Takes these two readings and write them down.
- 5) Now convert your compass back to grid north and your readings and with your protractor draw the respective front and back azimuths from this point on your map. Here is your location.

4-4. Understand how to identify the five steps for navigating using terrain association:

- 1) **Orient your map:** Every time you attempt to associate the map with the ground you must first orient your map.
- 2) **Determine your starting point or the location you started at:** Always begin from a location you know you can identify on your map and can associate with on the ground.
- 3) **Identify major terrain features:** Always make sure before you begin your journey you study and memorize major land features as this will help you navigate better as you become well associated to both your direction of movement as well as your the position of those features you will encounter when moving toward your plotted direction. It's best if you tell yourself aloud, how far you are going to travel, when encountering a certain land feature and its position. Like in 200 meters I should be coming across a small stream which will be to the north east of me. At 500 meters there should be a house next to a tree

to my west and so forth. This will help you keep track how far you have travel to some extent.

4) **Maintain an accurate pace count:** It is always best to remember and keep track of your pace and actual distance you have covered as it should match the ground distance you determined when plotting your points and direction of movement on a map. (Remember you need to use your pace count for this) Using ranger beads will help in your keeping track of your distance as for every 100 meters your travel one lower bead is moved downward and as for every 1000 meters you cover one upper bead is lowered while the lower beads are raised to recount your 100 meter distances. For the most accurate form of travel us a check point or some objective goal you desire to use to mark of each distance traveled.

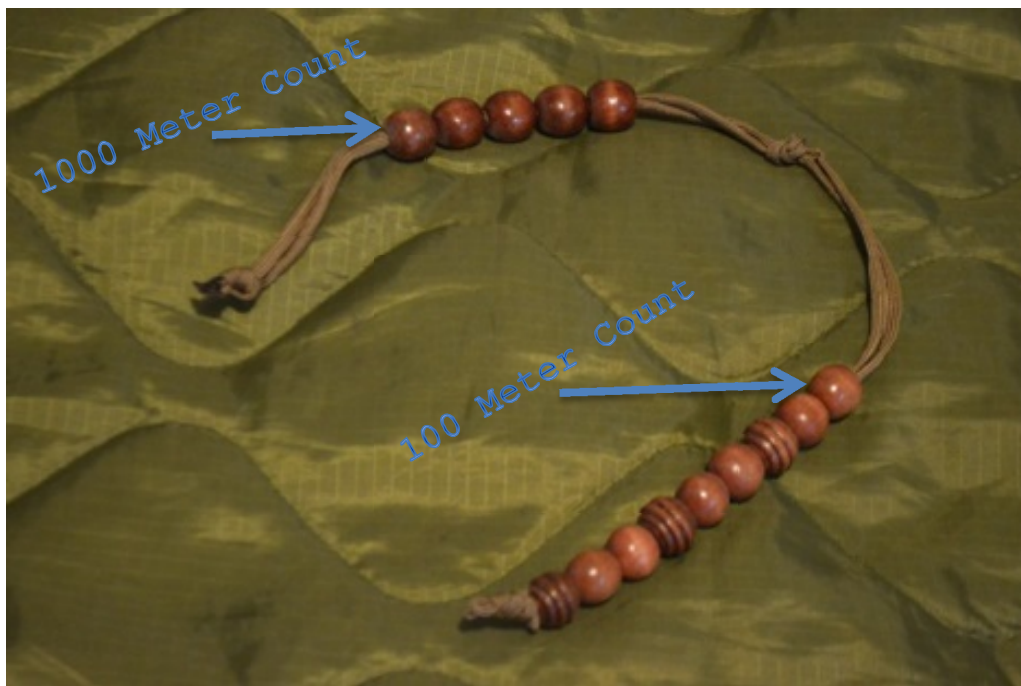


Fig 4. 4

5) **Verify your position at every check point:** When you arrive at the location you marked off as an objective or destination point, conduct a detailed comparison between the ground position and your map position to ensure you have arrived correctly to your location.

4-5. Understanding the term dead reckoning:

Dead reckoning is navigation term which uses only your pace-count and an azimuth. Terrain association is not used. Thus our dependence here will be completely and solely based upon the compass for our degree reading and pace count for the tracking of our distance. This is done when your location is densely filled with brush or trees or even barren terrain or when visibility is limited and you will not be able to visibly associate your current position with that of the land features or terrain feature around you. Dead reckoning may be the only means you have knowledge of as to where you are located on your map. Just remember using dead reckoning will only be as accurate as your pace count and ability to remain faithful in knowing where your last known point was and accurately performing an azimuth each time you proceed forward. Documenting your distance and movement is also an important role as you can keep track of where you went and where you have been already.

4-6. Identify how to navigate using dead reckoning:

Steps of dead reckoning:

1) **Determine location, distance and the azimuth:** Seek out and find your location by any means available. Then calculate the distance and each magnetic azimuth you will need to take between each segment of your journey.

2) **Step off:** Make sure while in route you check your compass to ensure that your heading in the direction you plotted and your count is accurate. Just remember the land features you choose as steering marks are not the same as steering by using terrain association as steering marks are rarely shown on the map. Also, maintain an accurate pace count keeping track of the pace you calculated it would take to get to a certain objective and repeat these steps until you arrive at your destination.