# Compass Reading

A compass is used to find the location of *Magnetic North.* Knowing where the magnetic north is, a person can easily identify the direction he/she is headed by using a map.

Aside from north, there are 31 other points found on a compass. These points are divided into *principal* and *non-principal* points. Principal points are further sub-divided into three: *cardinal, inter-cardinal,* and *non-cardinal.*

The term *box the compass* means to identify all the points of the compass starting from north going clockwise.

An Orienteering Compass
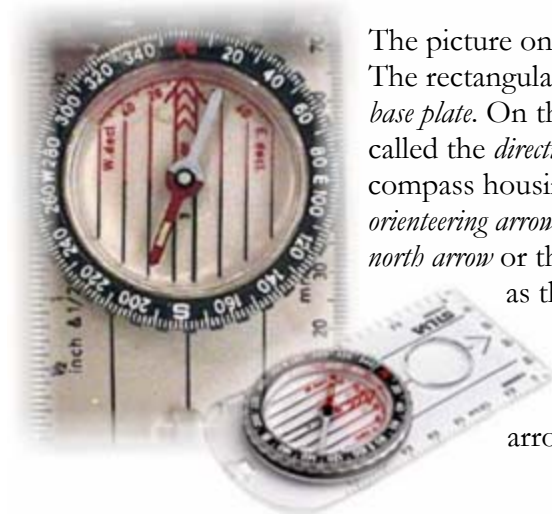
The picture on the left is a picture of an orienteering compass. The rectangular base with all the measurements is the *compass base plate.* On the base plate there is an arrow, that arrow is called the *direction of travel* arrow. The painted arrow within the compass housing that houses the magnetic needle is called the *orienteering arrow* and the magnetic needle is called the *magnetic north arrow* or the *dog.* The compass housing is sometimes called as the *doghouse.*

The term *place the dog in the dog house* or *orient the compass* simply means to point the orienteering arrow towards the direction of magnetic north.

Degree Notations

Most often, compass bearings aren't given to you in words (e.g., North, South), it is usually given in degrees. The compass rose is divided into 360° from 0 to 359. To be more accurate, surveyors and foresters use fraction of a degree. A degree is divided into 60 minutes (60') and a minute is divided into 60 seconds (60").

There are also times when bearings are given in notations such as 28° North of East. Meaning from facing east, turn 28° towards the north.

Using the Compass

The following instruction applies to using an orienteering compass.

Getting a Magnetic North bearing:

1. Point the direction of travel arrow towards the object or direction.
2. Orient the compass. The bearing directly below the direction of travel is the bearing of the object or direction.

Getting the location of a Magnetic North bearing:

1. Place the given bearing directly below the direction of travel arrow.
2. Turn yourself (along with the compass) slowly until the compass is oriented. You are now facing the given Magnetic North bearing.

Getting a Grid North or Map bearing:

1. Place the center of the compass housing over the point of origin.
2. Point the direction of travel arrow towards to point of destination.
3. Orient the orienteering arrow with respect to Grid North or the Map's North.
4. The bearing directly below the direction of travel arrow is the Grid North bearing.

Getting the location of a Grid North or Map bearing:

1. Place the given bearing directly below the direction of travel arrow.
2. Place the center of the compass housing over the point of origin.
3. Slowly move the compass, keeping the housing centered on the point of origin, until the orienteering arrow is aligned with the map's north. The direction of travel arrow is now pointing towards the bearing.

The Different Norths

Sorry to break the news, but there are 4 different Norths: *True North, Magnetic North, Grid North,* and *North Star North.*

*   True North is the location of the geographical North Pole.
*   Magnetic North is the origin of the earth's magnetic field and this origin is not the geographical North Pole.
*   Grid North is a map's own north, since the map is flat while the earth is round.
*   North Star North is the where the North Star is positioned, which lucky for us is located directly above True North. One less north to worry about.

Knowing this information, you should take note that 30° in True North, 30° in Magnetic North, and 30° in Grid North are not always equal. It all depends on when and where these bearings were taken.

Making the Norths Agree

Most geographical maps provide information regarding the deviation of the other North with respect to the True North. This is done through a Declination Value Diagram (DVD). In a DVD, the star represents True North or North Start North (the two being equal to each other). The circle represents Grid North and the flag represents Magnetic North or the Compass North.
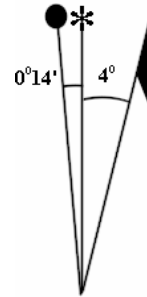
The DVD provides how many degrees, minutes, and seconds the other two norths deviates from True North. In the example DVD on the right, Grid North deviates $0^O14'$ west of True North. Magnetic North deviates 4° east from True North.

Note that deviation values and direction varies depending on the location.

To adjust from one bearing to the other simply remember the rhyme:

East is Least, West is Best

The rhyme simply reminds us that if it deviates to the East you subtract, if it deviates to the West you add.

An Example.

The bearing of point A to point B is 35° on the map. Using the Declination Value Diagram on the previous page, determine the compass bearing from Point A to Point B.

Given: 35° = Grid North Bearing
$4^O14'0''$ East = Deviation of Magnetic North from Grid North.

Using the rhyme was subtract: $35^O - 4^O14' = 30^O46'$

Magnetic North Bearing = $30^O46'$

The Moving Declination

As if having four different norths wasn't bad enough, the Magnetic North does not stay in one location. Each year it moves some minutes, this movement effectively invalidates any declination value taken for the previous year due to some minutes of error.

The Declination Value Diagram alone isn't enough to tell you the deviation of the different norths since the information is only true for one year, so further information is required.

APPROXIMATE MEAN
DECLINATION 1990
Annual change decreasing 6.3'
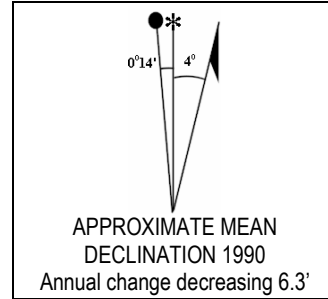
Along with the DVD, information on when it was effective is also provided and the information on the amount of movement the Magnetic North makes annually.

An Example.

The Magnetic North bearing of Point A to Point B is $30^O46'$ adjusted from a Grid North bearing in the year 1990. Determine the equivalent compass bearing from Point A to Point B in the year 2005.

Given: $30^O46'$ = Magnetic North from Grid North in 1990

Adjust it back to Grid North using the rhyme, $30^O46'+4^O14' = 35^O$

Do the necessary adjustment on the declination value:
Determine the Elapsed Year	$2005 - 1990 = 15$ years
Determine Movement	6.3' x 15 = 94.5 minutes
Convert to Degrees	94.5/60 = 1.575 ~ 1 degree
Convert Fraction to Minutes	0.575 x 60 = 34.5 minutes
Convert Fraction to Seconds	0.5 x 60 = 30 seconds
Adjust the Declination	$4^O - 1^O34'30'' = 2^O25'30''$
Declination from Grid North	$2^O25'30'' + 0^O14' = 2^O39'30''$

We have now determined the declination of Grid North to Magnetic North for the year 2005. Now we begin computing for what we really need.

Known: 35° = Grid North bearing
          $2^O39'30''$ = Computed Deviation

Using the rhyme, we subtract, $35^O - 2^O39'30'' = 32^O20'30''$

Magnetic North Bearing = $32^O20'30''$

References

Boy Scouts of the Philippines. Service Scout Handbook Part IV. Manila: Boy Scouts
of the Philippines. Pending.

Cliff Jacobson. Basic Essentials: Map and Compass. Connecticut: The Globe Pequot
Press. 1999.