MELBOURNE BUSHWALKERS Inc.

INTRODUCTION TO NAVIGATION

WELCOME TO NAVIGATION.

This handout is designed to give a brief introduction to navigation. It should give you a basic understanding of the principles involved. For a good understanding, it is highly recommended that you participate in a training course such as that offered by the club. You should also get some practice!

Navigation is an essential part of bushwalking, yet it is not a difficult skill to learn. Anyone who uses a street directory navigates, and many of the principles are exactly the same as for bush navigation.

This introduction covers the basic principles of bush navigation including:

- Maps
- Distances
- Grid references
- Compasses
- Directions
- Orientating the Map
- Route Choices

MAPS

The most essential item for bush navigation is a map. In fact some people use little else. A map is simply a drawing of what a part of the Earth looks like. There are several kinds of maps (including street directories). The type of map that is best for bushwalking in Victoria are the 1:25,000 topographic maps from VICMAP, and the newer more up to date 1:30,000 maps.

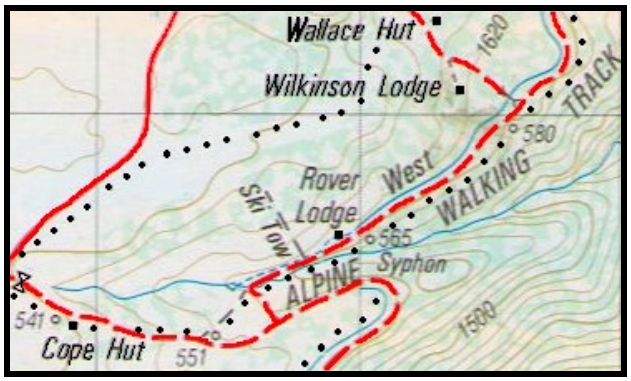
Maps show a number of features, often in a variety of colours. Roads and tracks, creeks and streams, dams, fences, vegetation types and a number of other features are usually readily identifiable. Any map should have a legend somewhere around the edge, showing how all these features are represented.

Practical Exercise: Get yourself a map and study the features, using the legend.

A particular feature of maps is contour lines. These are continuous lines which indicate the shape of the ground. They will show hills, valleys, ridges, spurs, etc. often in some detail.

Contour lines are actually drawn along points of equal height above sea level. Many have the height indicated on them and you can therefore calculate how far apart they are, and whether a slope is up or down. The lines are usually either ten or twenty metres apart, depending on the map, and are almost always the same interval on any one map.

Practical Exercise: Find a hill and calculate how high a climb it would be to get up it from the bottom.



Part of a typical Map

Although it won't tell you everything, careful reading of a map will show you quite clearly what an area looks like even without being there. You can therefore often use a map to get to where you want to go, even without a compass. You can follow a track, cross over a hill, follow a river, etc. to reach your destination. (Although it's usually a good idea to use a compass as well).

Practical exercise: On a map locate two separate points. They can be anything you like.

Then find a route from one to the other that you could follow if you were there.

DISTANCE

When you are on a bushwalk it is important to know how far you have to go, or have gone. All maps have a scale somewhere around the edge which shows you what the measurement is. On a 1: 25,000 scale map each centimetre on the map represents 250 metres on the ground. You can then use a ruler or other device (most compasses have scales on them) to measure distance on the map.

Maps also have grid lines on them. These are faint black lines running straight up and down and across the map. They are usually one kilometre apart, although you will need to check this on each map. You can therefore use these to measure distances.

Practical Exercise: using any two points on the map, measure the distance between them.

When you are actually out in the bush it can help to know how far you have travelled. You could do this by pacing, if you know how far you walk for a given number of paces. Or you could do it by measuring the time you have walked, if you know how fast you walk. This is easier but less accurate.

GRID REFERENCES

Using the Grid Lines on a map, you can accurately specify any point on the map. If you look around the edge of a map you will see that there are numbers at the end of each of the grid lines. You can use these numbers to specify a square that contains a feature that you wish to refer to.

For example, a hill that you want to go to, might be in square 26 12. This number indicates the lines that are to the left (26) and below (12) the hill. Therefore if you referred to the hill in square 2612, people would know which square to look in.

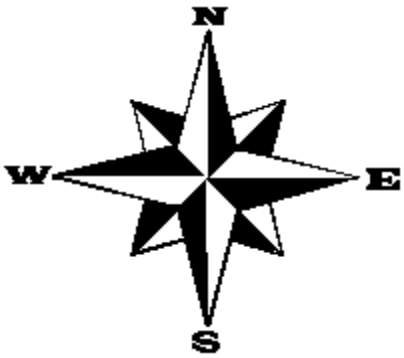
Always give the numbers going from left to right (called Eastings) first. The numbers going from bottom to top are called Northings, and come second. (Other wise our reference could refer to two squares - 2612 or 1226).

This four-number reference will give you a one kilometre square area, within which is your feature. However this is a 1000m^2 area, and is a bit big - there could be several hills in this area..

Using a ruler or other scale, or by estimation, divide the square up into ten. Then add the number of tenths within the square that indicate your point, to the original numbers. This will give you six digits now (eg. 26<u>5</u> 12<u>8</u>) and will indicate a 100 x 100 metres square in which to find your feature. This should now be small enough to easily identify it.

A guide as to how to use grid references is usually to be found on each map.

Practical Exercise: Identify a feature, and



work out the six-digit grid reference for it.

DIRECTIONS

To get from one place to another, it helps to know what direction to take. For instance you can go North, South, East or West. You can also go North-West, South-East, etc., or you can even go North-north-west, East-south-east, etc.

To make it a bit easier, we use a circle divided into three hundred and sixty points, or degrees (°). You then measure the number of degrees between North and the direction that you want

to go in, always measuring in a clock-wise direction. You probably used a protractor in school to do just that.

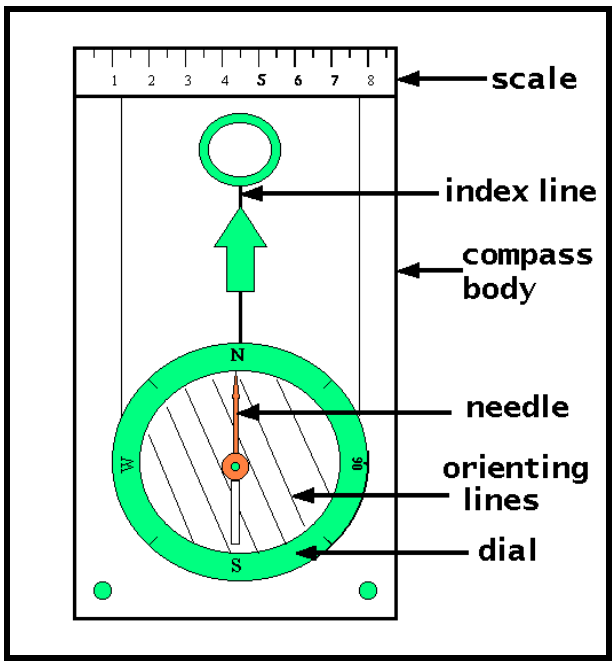
Note that North is always to the top of a map. You can therefore align a protractor with 0° to the top of the map, and then read off the direction required.

Practical Exercise: Identify any two points on a map (ideally fairly close together) and note the line between them. Then line a protractor up with the top of the map (North), and your line, and read off the direction in degrees.

USING A COMPASS

If you can use a protractor, then you can use a compass. A compass is simply a protractor with a North-pointing needle in it. The protractor on a compass is called the dial, and is the round movable part which has the needle in the middle of it. (see diagram)

A direction using a compass is called a bearing.



A typical Compass

You can use the protractor, or dial, on a compass to read off the direction, or bearing, of a line on a map. To do this it is actually easiest to put the edge of the compass body along the line that you want to read. You can then turn the dial to align with North, while keeping the compass body still. You will find that it is also easier if you have a compass with a long body.

On most compasses you will find several parallel lines within the dial, alongside the needle. These are called orienting lines, and you can use them and the North-South grid lines on the map, to line up the dial with North.

Having lined the body of the compass up with your line of direction, and the dial up with North on the map, you can then read off the bearing (direction) using the index line that runs through the centre of the compass body (see diagram). In this whole process you should totally ignore the needle. It is irrelevant.

Practical Exercise: get a map and a compass. Identify two points on the map, and find the bearing from one to the other using the technique described above.

If you were actually at the place on the map, you could now take your compass away from the map, and without moving the dial, use it to find your way through the bush to your destination. To do this you now use the needle. Because the needle points North and South on the earth, you can line the compass up with the needle, and follow the bearing that you have set.

To do this you turn the entire compass around, keeping it flat, and not touching the dial. Turn it around until the North on the dial is in line with the North (red) end of the needle (which should stay still, as it always points north!). The body of the compass will now be pointing in your required bearing.

There is now just one adjustment that you must make.

GRID NORTH AND MAGNETIC NORTH

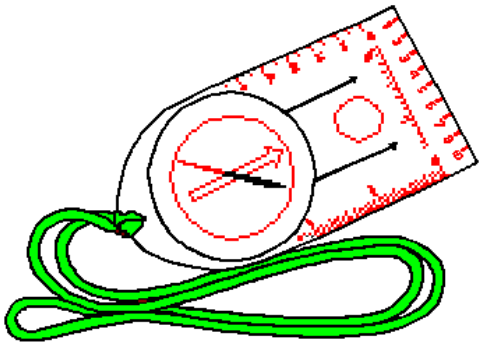
Yes, there is more than one north! In fact there are three, but here we are only concerned with two - grid and magnetic. Grid north is the

North to which maps are aligned, and does not move. The Magnetic North Pole actually moves (very slowly) and as a result is in a different place from the grid north.

Magnetic north is (slightly) different to the north on the map, and as we have taken our bearing from the map, we must make a corresponding adjustment otherwise we will end up in the wrong place.

All maps show what the difference is. They will have a diagram like the one on the right, and a description of the magnetic declination, or variation, which will be something like 11° 54' east. (The ' is for minutes, or 60ths of a degree.) The variation also moves very slightly but we will ignore this on this occasion.

In this example, we must make an adjustment of about 12°. (you can't really navigate accurately to less than a couple of degrees). To do this we move the dial on the compass. The direction in which you move the dial will depend on what direction the magnetic variation is from grid north. In Victoria it is always to the East, which means that we subtract 12° from the grid bearing to get the magnetic bearing. For example, if our grid bearing was 125°, we change it to 113°, and now can follow the compass as described before.



There are a couple of memory joggers that people use to remember which way to make this adjustment. Any use of the letters **GMS** (**G**rid to **M**agnetic - **S**ubtract) seems to work well for most. **G**rand **M**a's **S**ocks perhaps? Whatever works for you. Just don't forget to do it!

ORIENTATING THE MAP

The most basic thing in navigation is to orient the map. The map is orientated when directions to features on the map line up with directions to those features on the ground, Once the map is orientated you can easily identify features and see which way to go to follow the track shown on the map.

The easiest way to orient the map is to line up your position with a known feature on the map that you can also see on the ground., such as a mountain or a road.. Sometimes however there is no easily recognised feature or you don't know where you are on the map. The thing to do then is to use your compass to line up magnetic north on the map with magnetic north on the ground, which is what the red end of your compass points to and this is how you do it. It is a simple 3 step process:

1. Set the compass dial to minus the magnetic variation. For an average variation of 12 degrees east, set it to 360-12 equals 348 degrees
2. Place the edge of the compass along a north-south gridline. The N on the dial is now aligned with magnetic north on the map
3. Holding the compass firmly on the map, rotate map and compass as a unit until the red end of the compass needle points to N on the dial. The map is now orientated!

Try it, think about it and you will soon understand why it works. You can now navigate without having to fiddle with any more compass bearings.

ROUTE CHOICES

Having learnt how to read a map, how to measure distance, how to take a bearing, and

how to use a compass, you now need to decide on a route.

In flat, open country with little scrub and, it can be easiest to set a bearing and follow it for a set distance. In fact this can be the only practical way in featureless country like the desert. However this is rarely the case.

There are often better alternatives than going cross-country. In some instances it can be downright impossible - there may be a ravine in the middle! There will also be lots of times when there is simply an easier way. There may be a big hill in the middle when there is a road around. Or there may be a steep valley in your path when there is a gently spur on one side.

You will almost always find that the easiest and most enjoyable way to get to where you are going is not in a straight line. Tracks are much easier and[ds1] faster to travel along than through the bush, (although it may be nicer through the bush). Sealed roads are fast but are hard on the feet and then there's the traffic! Thick scrub is to be avoided as much as possible. Ridges are generally better than gullies.

You should also consider what you are aiming for. A road can be much easier to find than a small knoll.

So remember when you are looking at a map to figure out how to get from A to B, that the journey in between is very important and look out for the best way to get there.

Now, go and get some training and some practice (take a map on your next walk!), consider doing an introduction to Rogaining, and most importantly have fun!

Reviewed May 2024