

Navigation

Tools of the Trade

- A map which has a scale of 1:25,000 Or 1:50,000, laminated or kept in a flexible map case (Ortlieb)
- A compass with 360° and a large base plate e.g. Silva type 4/54
- An altimeter

Maps

Regardless of the scale of map you use, it is important to become familiar with the map, and one of the best ways of doing this is to refer to the key, sometimes known as the legend.

Before venturing out and having to use the map in earnest, make sure you know the following:

- How many millimetres make a kilometre
- How many millimetres make 100metres
- How far apart are the contour lines, 10m, 20m or something else
- Is the contour spacing different on different parts of the map (France – Switzerland/Italy)
- Are there grid lines to take a bearing from
- What is the magnetic variation
- How do you give a grid reference from the map
- How are glaciers represented
- Are cliffs shown on the map.
- Are slopes over 30 degrees indicated
- How are depressions shown
- How are ridges, gullies and cols represented
- How are ski routes shown
- How are lifts represented
- How are water features shown

One of the most important features of a map are the contour lines, spend a lot of time becoming very familiar with them.

- Contours close together = steeper ground
- Contours further apart = easier angled ground
- Contours missing = very steep ground
- Contour lines in bold = index contour lines, usually 50m or 100m apart

Contour lines help us establish how steep a slope is and this allows us to keep off slopes, which are steep enough to avalanche.

For example if you measure a horizontal distance of 100m on the map and over that distance the drop is 50m, the slope will have an average angle of 27°

Compass

A compass with a large base plate is easier to work with

- Can take bearings and back bearings over longer distances
- Doesn't get lost in a large gloved hand when following a bearing
- Has a magnifying glass to help with fine detail
- Has a romer scale to make measuring distance and giving grid references easier
- Has rubber feet to stop it slipping on the laminated map or map case

The compass should have a housing which is divided into 360° (military compasses with 6,400 divisions (mils) are not so easy to use in bad light / conditions).

Altimeters

When the weather closes in, altimeters can be a valuable tool for the skier travelling away from the piste.

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Altimeters that are incorporated into wrist watches use, as other altimeters do, a barometer to measure atmospheric pressure and then from that calculate the altitude, giving a reading in meters

International standards tell us that the reference atmospheric pressure for sea level is 1013 mb.

Atmospheric pressure decreases with altitude, by approximately 1millibar (mb) for every 10 metres of ascent.

Therefore, when the pressure is measured at sea level to be 1000mb, and you ascend to a place where the barometer in your watch says 600mb, if you switch the function to 'Altimeter' it will read an altitude of 4000 meters.

Due to the ever changing weather, the atmospheric pressure keeps changing, sometimes slowly, but on occasion very swiftly.

It is vitally important, if you are going to rely on the accuracy of the altimeter, that you re set the altitude at every opportunity.

On a day's ski tour, check the altitude reading on the altimeter against the altitude displayed at lift stations or on the map, and change it if there is a difference.

During a day you might check, and adjust if req'd, the altimeter against the map at the following locations

- Lift Station
- Col
- Lake
- 2nd col
- Summit
- 3rd col
- Mountain hut

Should the cloud roll in on the descent from the 3rd col to the mountain hut, you will be able to rely upon your altimeter to tell you when to stop skiing down the valley and head up leftwards to the hut that sits safely on an isolated rocky promontory.

At base, it is useful to observe the changing pressure shown on your watch.

If overnight the pressure drops by 20mb, there is very good chance that the weather for the day ahead will not be as good as the previous day.

Likewise, should the pressure rise noticeably overnight, there is a chance the weather will be better.

Orientating the Map

In good visibility orientating the map can help greatly when it comes to identifying where we are and what surrounds us.

- Place your map on a table with the compass on top
- Turn the map but not the compass until the grid lines are parallel with the magnetic needle of the compass, making sure that the north end of the grid lines are pointing in the same direction as the north end of the compass needle
- If there is too much metal in the table this won't work!
- Use man made features to help you orientate the map, such as lift lines
- Use natural features also, especially ones with straight edges, like valleys or ridges

When the map is orientated you can walk round it and eye-spy different features, dropping your eye to the map and following a line back to where you are on the map, the feature you are looking at will be close to this line.

When trying to work out what mountain that is over in the distance, count the number of valleys between it and you on the ground, then go to the orientated map and work away from your known point counting off the valleys and ridges in the direction of the mountain, this should bring you close to where the mountain is on the map.

Not Getting Lost

Whilst navigating from one place to another it is easy to get lost in poor visibility and then find yourself on a slope, which might avalanche or skiing over a small cliff, which you had not expected to come across.

To avoid getting lost use as many navigation tools as possible to help you on your way

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- Read the map carefully and interpret what it is telling you
 - Will you go directly down the slope or slanting to the left at an angle
 - Will you be contouring the mountainside
 - The journey will be over flattish ground to start and then it will go steeply down
 - There will be a gully on the right half way down
- Take a bearing
 - Guess the bearing first to avoid going off in the wrong direction
 - Remember to adjust for the magnetic variation if there is one
 - Hold the compass base plate at right angles to your chest when following it
 - Hold the compass away from your body so that it is not affected by other metals
- Use the altimeter
 - Make sure it is set to the correct altitude where you are
 - Identify the altitude you are descending to
- Read the ground
 - On the descent, pay attention to what you see and feel
 - I expected to see the gully on the left ☺
 - I did not expect to have a cliff on my right – Check the Map!!
 - The ground is a lot steeper than I expected – Check the Map!!
 - I have crossed a stream bed as expected ☺
- Use time
 - It is very difficult to use timing on a descent, but at least have a cut off time, don't just keep going in the hope you will get there.

Other tools for ascent

- Timing
 - Calculate the time for the journey at 4km per hour initially
 - Add on extra time for the ascent, try adding 1 minute for every 10 metres ascended
 - Change both of the above if the formula is not working
 - Stop when your guesstimate time has run out and appraise your location
- Pacing
 - This is not easy or often done on skis, but you can work out how many paces you take to 100 metres over different angles of terrain