

Don't let things get out of hand

80% of the navigation is done before you go on the trip.

It is individuals who get into the worst trouble and have accidents.

Usually because they do not have adequate knowledge of the area.

Or they become separated from a party without having taken part in the route planning or progressive navigation.

Don't leave it until it is too late

Make sure you get a copy of the map and details of the route from the leader.

Study the map and the route before you go on the trip

Take the map with you and keep an eye on where you are as you go along.

If things go wrong or you get separated you have a much better chance of recovery.

Navigation is about error minimisation.

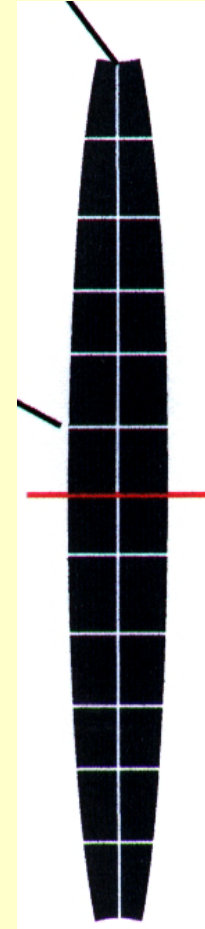
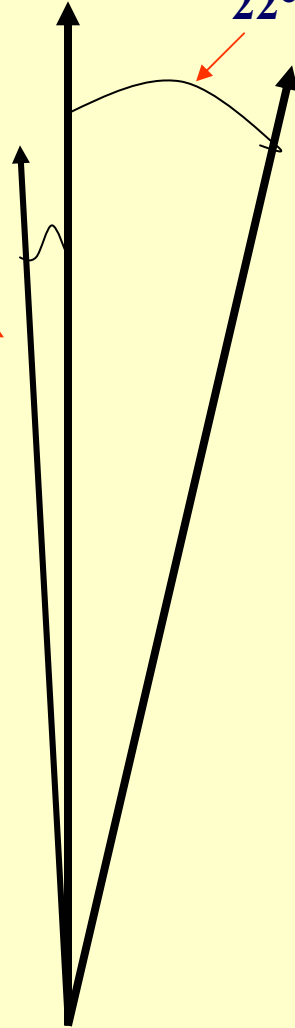
North Longitude

Magnetic North

22° E

Grid North $\leq 4^\circ$ wrt true north

- ▶ **Grid north**
- ▶ **True north**
- ▶ **Magnetic north**



The lines of longitude are not parallel so the variation between true and grid north varies across the map

Maps Available for Mountain Travel

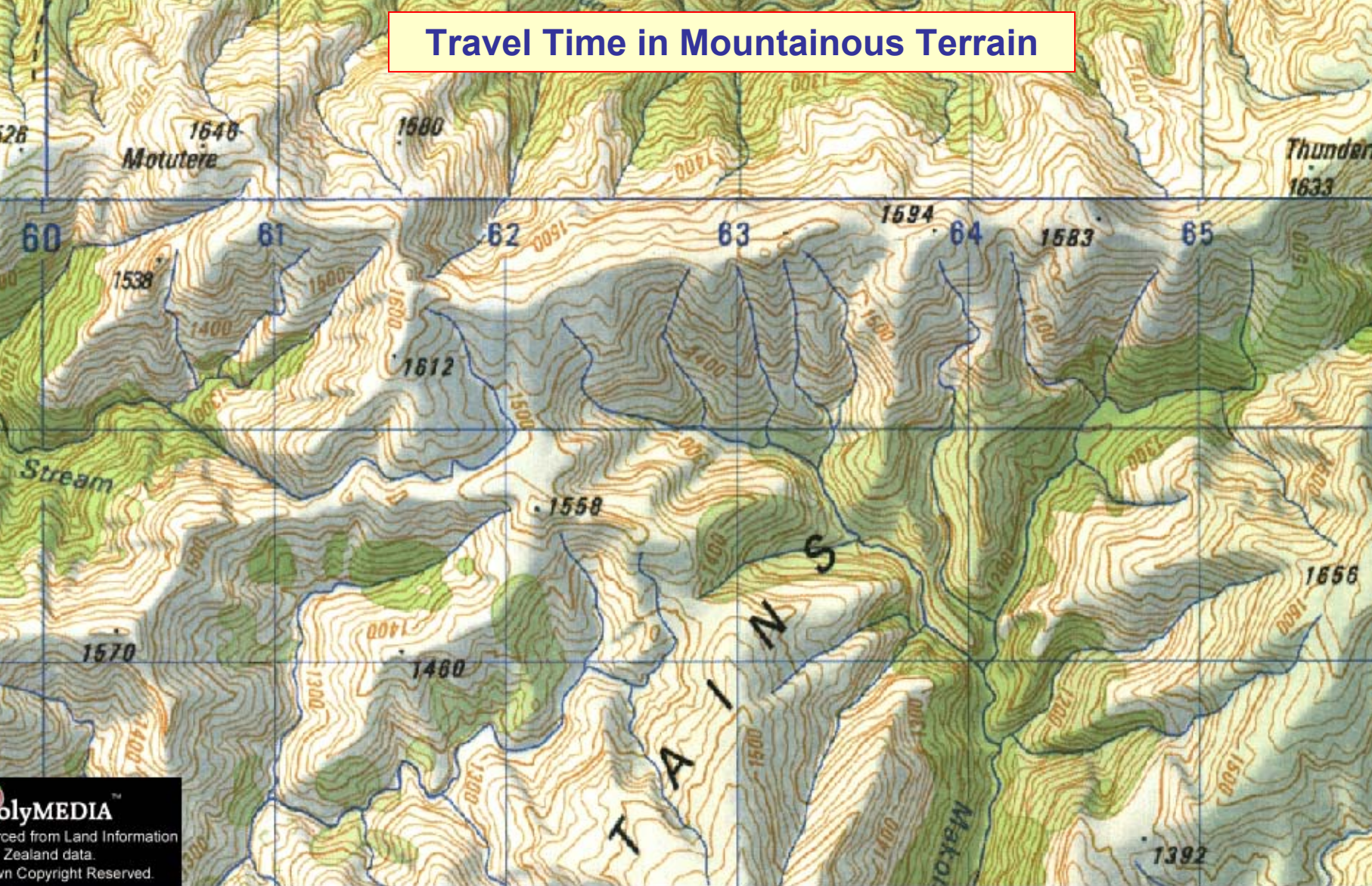
- NZMS 260 Series 1:50,000
- Parkmap 274 Series 1:100,000 – 1:155,000
- NZMS 262 Series 1:250,000 (regional maps)
- Holidaymaker 336 Series 1:100,000
- Electronic maps based on the 260 series

All printed maps share the same grid reference system but not to the same scale

Map Scale and Distance Calculation

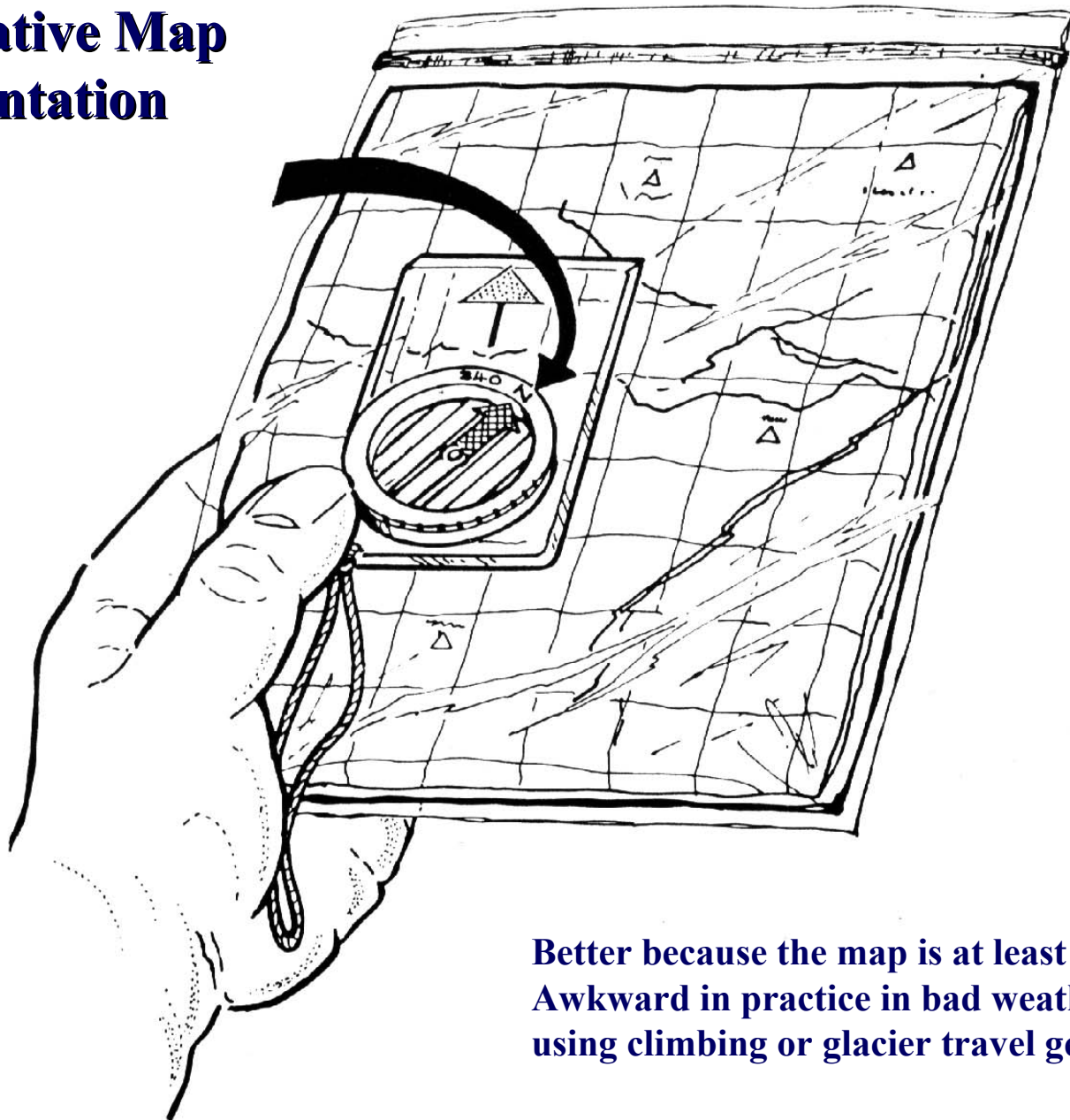
- **NZMS 260 Series maps are 1:50,000 scale**
- **Forest & National park maps are usually 1:100,000 scale**
- **At a scale of 1:50,000 => 1mm on the map = 50 metres on the ground**
- **In typical bush terrain the rate of progress is normally about:
20 minutes per Kilometre plus 4 minutes for each 20m of climb
(each contour line crossed)
Calculate the time required to go from Thunderbolt to
Motutere. Use the scale on the compass.**

Travel Time in Mountainous Terrain



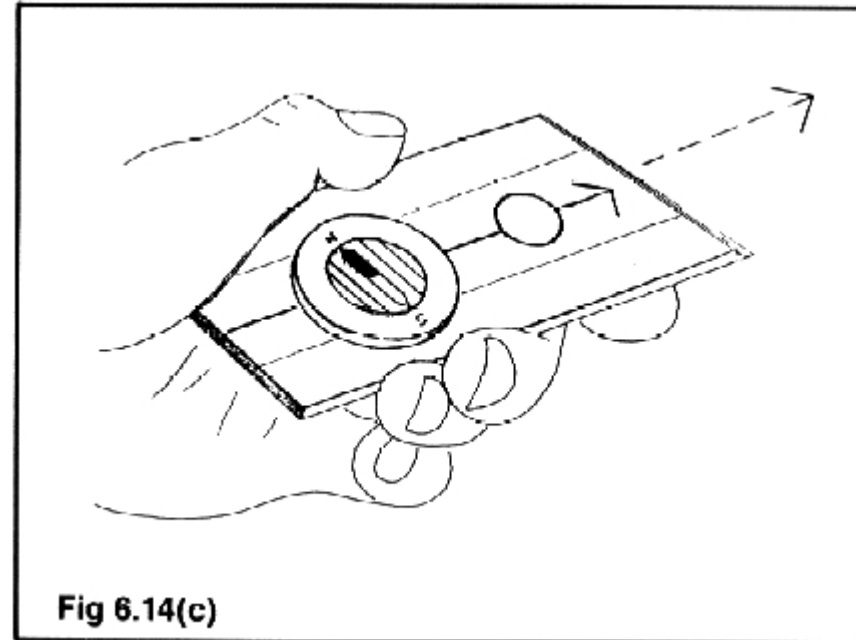
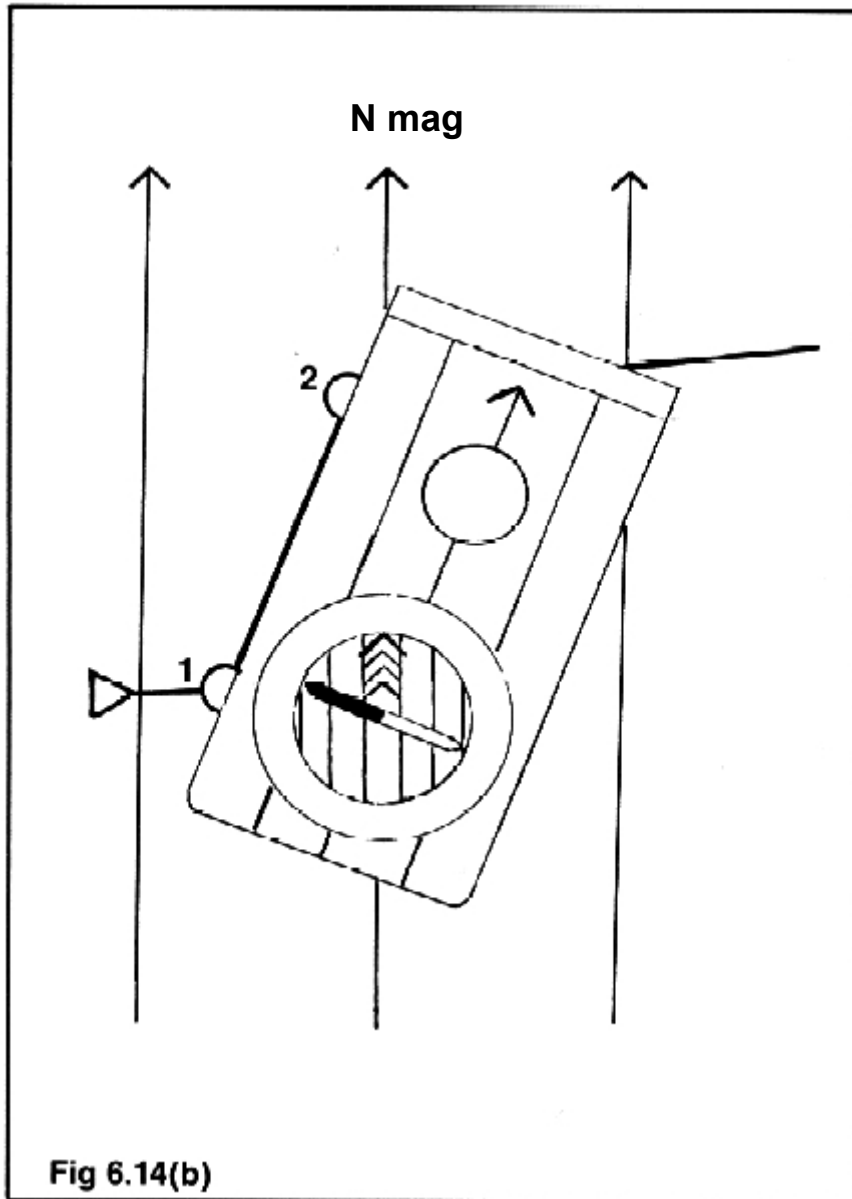
Section of the Thunderbolt Range, Calculate the time required to go from Thunderbolt to Motutere. (5.5km plus 12 vertical contours = 2hrs 38 minutes)

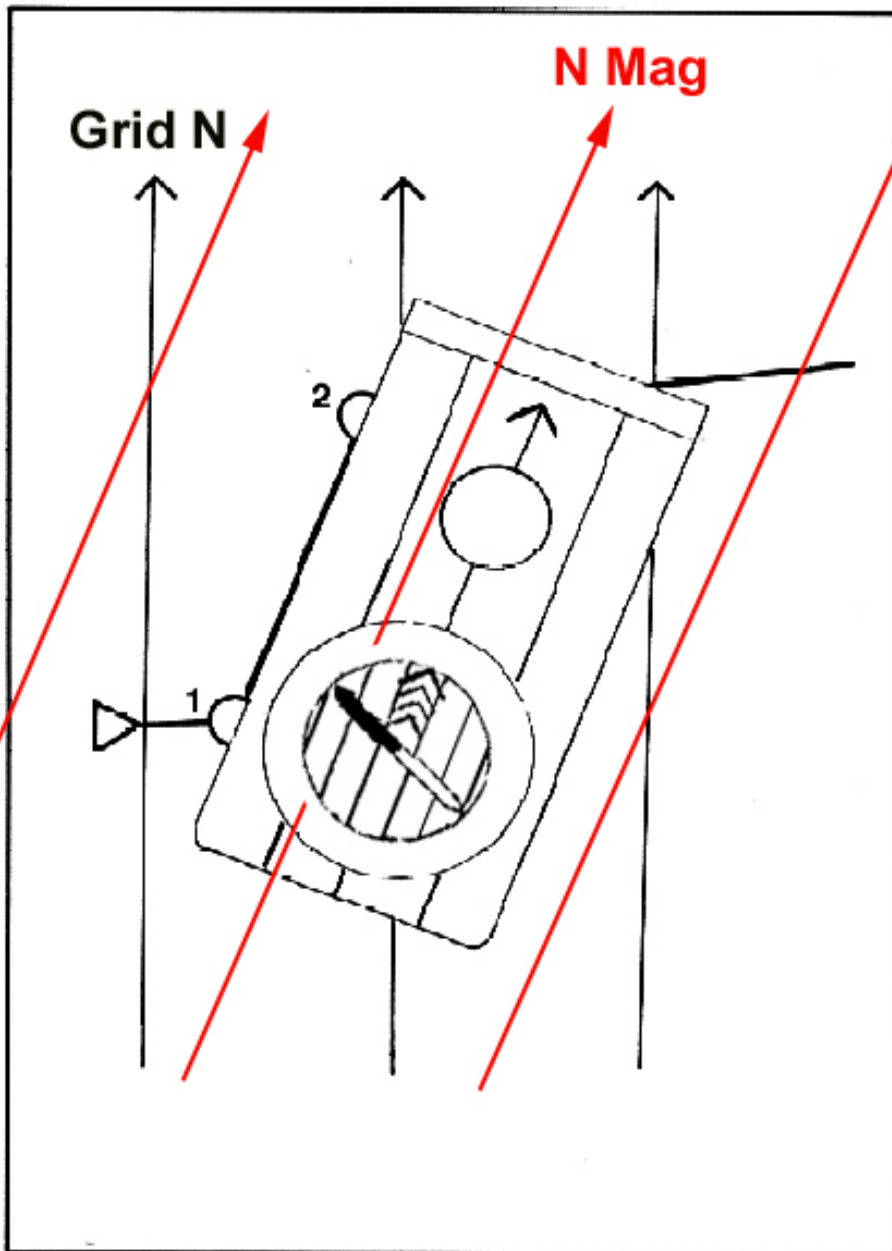
Alternative Map Orientation



**Better because the map is at least protected.
Awkward in practice in bad weather or if
using climbing or glacier travel gear.**

Setting a bearing on an orienteering compass





Setting the bearing on a topo map.

Imagine a magnetic grid superimposed over the map at 20° east of north (clockwise). You need to set your compass to that.

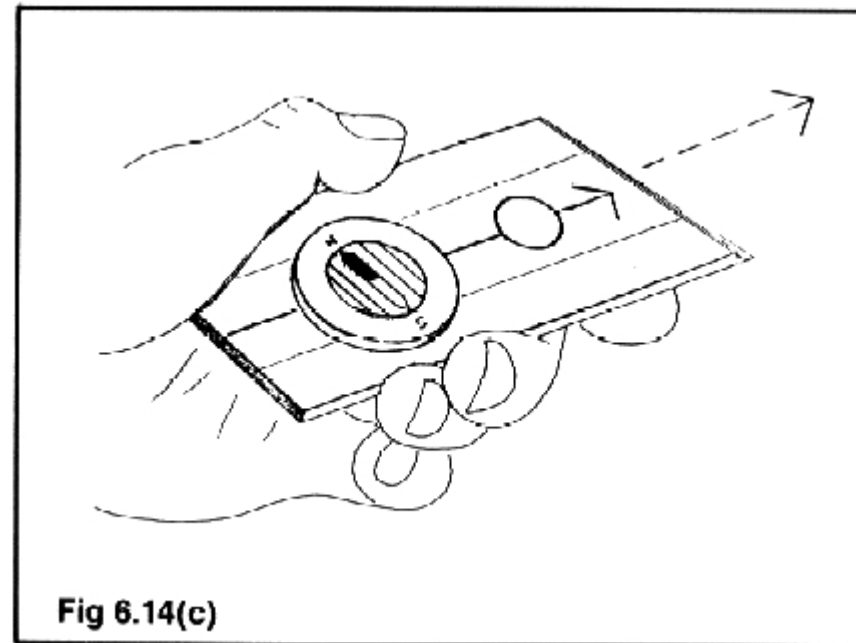
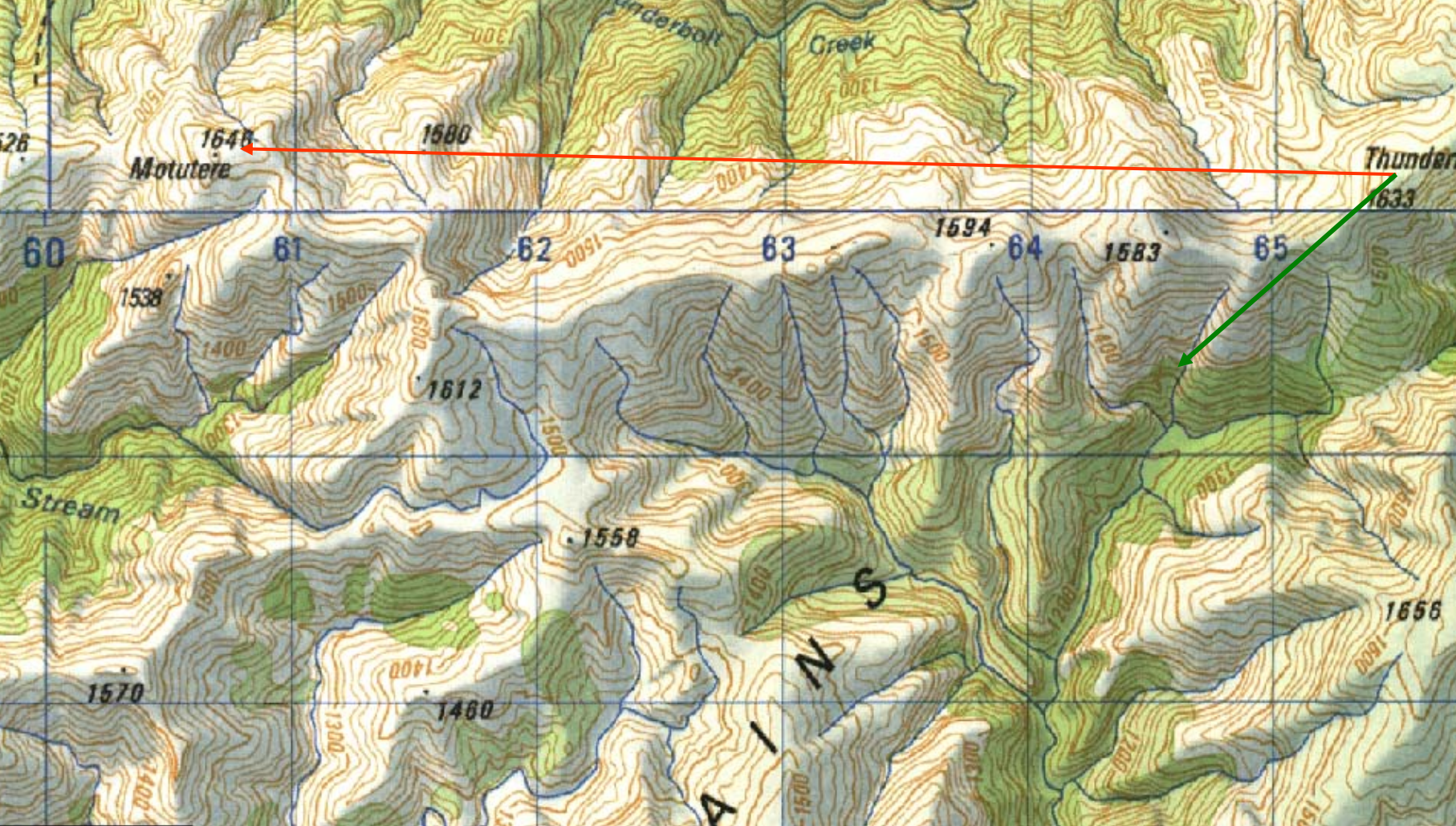


Fig 6.14(c)



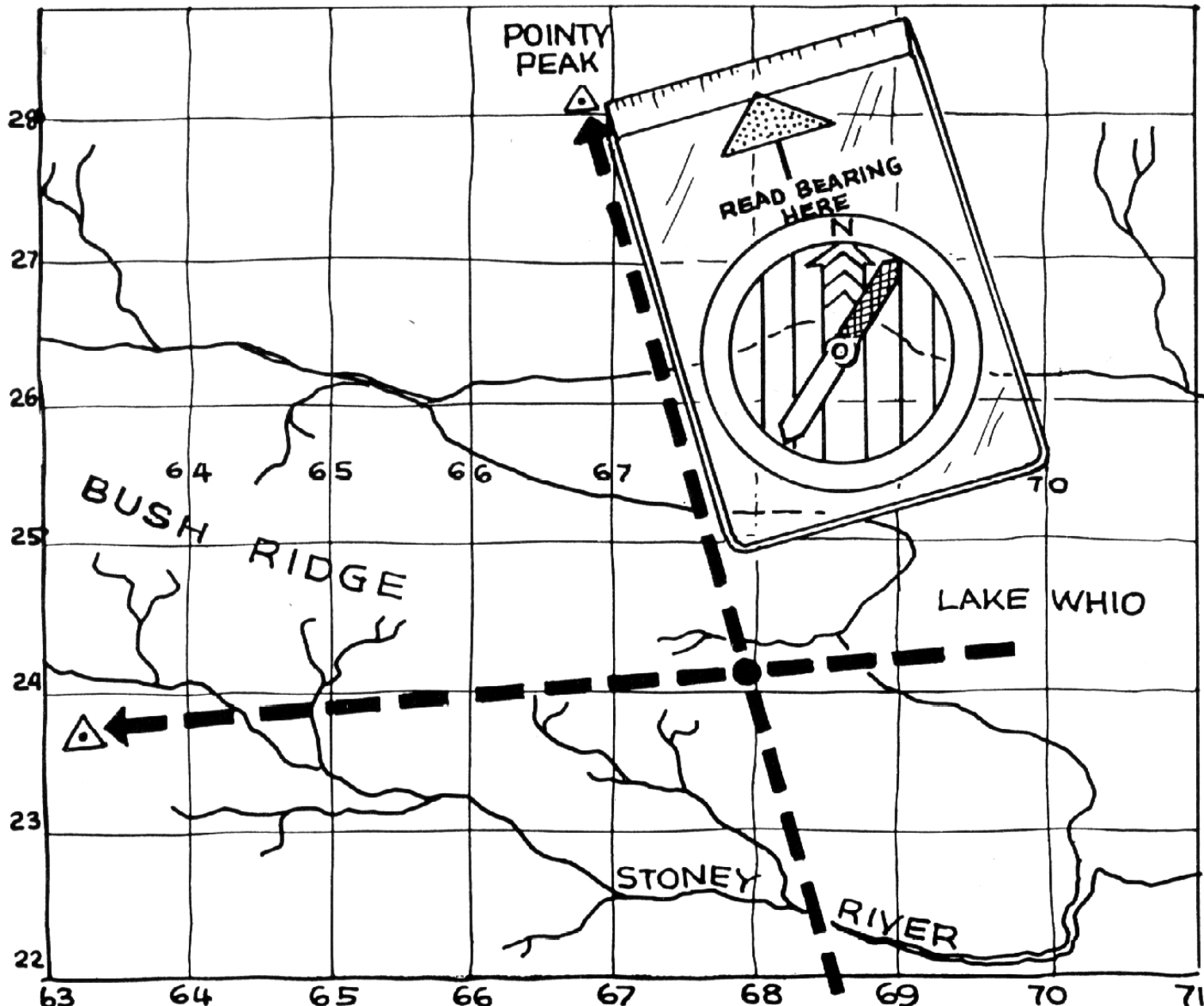
The problem of Immediacy. From Thunderbolt the direction towards Motutere is along the ridge taking the first 150 metres, 3mm on the map. The route stays on the top of the ridge

The initial Direction is along the green line to the small high point and then turn 120° right

Setting an Orienteering Compass on a Topomap

- ▶ Place the compass on the map with the baseplate pointing in the direction you wish to indicate on the ground.
- ▶ Rotate the needle housing parallel to the north grid with the red pointer facing north on the map.
- ▶ Rotate the needle housing 22° to the right (= east=clockwise) to align the needle with magnetic north. Note that 22° E is 2 large divisions and 1 small division. You do not need mental arithmetic.
- ▶ Remove the compass from the map.
- ▶ Hold the compass level with the red needle housing arrow pointing parallel to the needle.
- ▶ The compass now indicates the required direction on the ground.

Back Bearing Concept



Direction of a linear feature with changes of direction

- ▶ **Align Compass with the feature (ridge or riverbed or track)**
- ▶ **Rotate bezel until the needle north is over the north indicator**
- ▶ **Adjust for magnetic deviation by rotating 23° left (anticlockwise)**
- ▶ **Place the compass with compass bezel parallel to the north map grid**
- ▶ **Slide the compass around on the map feature until the compass plate is parallel to a likely section of the feature. You need to keep the compass bezel parallel to the north map grid.**
- ▶ **You may need to check several likely possibilities if you are in error by more than $\pm 500\text{m}$.**

If You Do Get Lost!

- ▶ **Keep calm & think rationally (reasonably easy in a party, hard when you are on your own or in sole charge of children).**
- ▶ **Stop. Take a break and get out the map & compass**
- ▶ **Review (with the whole party) your last known position. Estimate how long you might have been off route (gives a guide to the level of positional error)**
- ▶ **Look at the options for what you might have done. Check the directional information (watercourses, spurs, ridges even the slope direction).**
- ▶ **Look around for as much information about your location as you can. Ridges, tops, side streams, bushline or distinctive vegetation or any distinctive feature. Note the slope of the ground. Discuss any such features that you have already passed recently.**
- ▶ **If possible, try to get a view of your surroundings. Remember that the great apes often break bones falling out of trees!**
- ▶ **Make a short list of possible alternatives. Decide the appropriate action for each and then decide on the likely option. Note your possibilities list next slide.**
- ▶ **Action your choice, carefully noting any features in the location which will give you a clue as to your position. Keep together and do not take any risks.**

The likely possibilities for loss of Route

The most common causes of loss of route in the mountains are:

- ▶ **Wrong spur when descending tops, usually due to poor visibility.**
- ▶ **Forced to drop into an unidentified watershed in bad weather**
- ▶ **Incorrect watercourse junction**
- ▶ **Missed or drifted off a track, usually when descending**
- ▶ **Unable to see the route on a uniform snow slope or glacier**
- ▶ **Unable to identify the correct spur to leave an untracked watercourse.**

If you are truly lost

- ▶ Use the approach for a team but do not move unless you are both sure and have experience. Otherwise stay put!
- ▶ If you do move, mark your spot and mark the route as you go
- ▶ Be careful, manage your energy, don't rush, run or panic
- ▶ Stop early if you have to. Try to make any permanent stop first in a stream or river or secondly on a ridge top. Remember that you will need water even if you don't need food.
- ▶ Take all your gear with you, it's the best survival kit
- ▶ Be very careful about crossing rivers. Falls down a bank or waterfall and drowning are a common fate of lost individuals.
- ▶ Above all, do not take any risks!

Setting Up The Garmin E-Trex

- 1.** The time zone or UTC Time offset (+12:00 hrs in NZ)
- 2** The Units of measure as metric
- 3** The Map Datum as Geodesic Datum 1949 (Geo DATM 49)
- 4** New Zealand Grid (=NZMGRS)
- 5** Set the North Reference to GRID
- 6** Note that software & an interface cable is available to upload the new NZMGRS 2000. The new NZ datum can probably be entered manually using data from the LINZ site.

Accuracy of a hand held GPS

Expect about ± 10 - 60 metres lateral accuracy depending upon the satellite availability and the canopy. You need 4 satellites for an accurate position.

If Selective Availability is switched on then it will be at least 100 metres.

Vertical accuracy is ± 100 metres (mostly about 5 to 50 metres depending upon the availability of satellites). My house reads 22 - 28 metres which is very close to the DP. In practice if the lateral accuracy is ± 10 metres then the vertical accuracy will be ± 10 metres as well.