

A photograph of three hikers with large backpacks ascending a steep, rocky hillside. The hillside is covered with low-lying, brownish scrub and patches of green moss. The hikers are wearing blue and black gear. The background shows a valley with more scrub and a small stream at the bottom right.

Expeditions

A Craft Manual

The Boys' Brigade

Inside Front Cover

Front Cover Photo:
Going South in Upper Glen Esk, Angus

EXPEDITIONS

A Craft Manual

Compiled by
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With generous assistance from the staff of the Scottish Expedition Training Course

Version 14.0 following further amendment December 2019

"It's supposed to be hard, - otherwise everyone would do it. It's the 'hard' that makes it great"
Tom Hanks 'A League of Their Own.'



At Chalet des Fours in the Ormente valley, Beaufortain, France

Foreword

"These are my principles. If you don't like them, I have others"

Groucho Marx

This book was created to support the Scottish Expedition Training Course for Boys' Brigade staff at Carronvale National Training Centre. Thus its orientation is as a learning aid and reference for adults, rather than boys.

Nor does the content just reflect the views of the writer for it has drawn widely on the experience of the Carronvale Expedition staff, and over the years has also taken points on board from students participating in the annual courses. Course students are not, by definition, experienced in leading youth expeditions, but on occasion the likes of a Royal Marine or a Paramedic appears in our classes, and then we listen as much as we teach!

This, version 14.0, has been updated to incorporate developments in the last 5 years. Changes from version 13.0 are not extensive but some important detail has been amended. As the quotation at the top of the page implies, feel free to write-in if you have alternative views to those printed here. We don't promise to agree with you, but we do promise to give your views a very fair hearing.

This is unashamedly a Scotland orientated book, - simply because that is where its experience base has always been centred. Hopefully it isn't too complacent to say that Expedition practice designed for Scotland is likely to prove robust enough for wilderness areas elsewhere in the UK, but it is recognised that expeditions in other parts of the U.K. may face different issues, including different laws, related to working in more populated areas, and south of the border. With apologies to lady readers this book is also written in the male gender for simplicity of expression: No offence intended!

Lastly give some thought to the spirit of Expedition work. It is "Adventure", which is defined by the Oxford English Dictionary as *"An unusual and exciting experience, a daring enterprise; a hazardous activity."* It is of course important to teach and lead to high standards so that your young charges consistently return home intact, - or at least no worse than slightly frayed at the edges! However if you find that what you plan just becomes drudgery and ritual suffering for an award, - or that a pre-occupation with absolute safety has removed the fun and adventure then, dear reader, you have missed all the key points rather badly!

GJF: December 2019

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Chapter 1: Organisation

"The more I see of war, the more I realise how it all depends on administration and transportation. it takes little skill or imagination to see where you would like your forces to be, and when; it takes much knowledge and hard work to know where you can place your forces and whether you can maintain them there."



Field Marshall Earl Wavell

All expeditions need proper advance preparation and Boys' Brigade expeditions need particularly detailed organisation because the boys involved will often be inexperienced. It therefore falls to the officer in charge to compensate for that with the quality of his organisation. The four main elements of expedition organisation are Preliminary Planning, Administration, Leadership and Follow-Up, and each of these is analysed separately below.

1.1 PRELIMINARY PLANNING

There is a certain minimum level of expedition planning needed to allow an expedition to be organised. That is what is required at this initial stage. Detailed route planning is covered in Chapter 2. Preliminary Planning includes:-

Purpose: An important issue for any expedition is the question of why it is being held. There are many answers to this question because there are many types of expedition, but in every case the purpose should be defined. If this is done there will be less risk of the trip being too hard, too easy or too uninteresting for the people involved.

Party and Dates: There is little point in arranging an expedition to meet the needs of any specific group if that group cannot all attend. One of the earliest tasks of the organiser is therefore to fix dates and times agreeable to all those who need to be present. It will also be necessary to arrange a party within the recommended expedition party size range of 4 to 7 persons.

Transport: If transport is not available then the range of options will be very much reduced, if indeed the trip remains possible at all. It must also be remembered that transport has cost implications.

Cost: Boys often have problems in finding money for expeditions. They may therefore need time to save-up for the trip. Set the fee as early as possible and avoid pricing anyone out of the expedition.

Equipment: The group may need hired equipment that other parties may wish to use on the same dates. So make your booking well in advance and ensure that the reservation is clear (preferably in writing) and official. Mix-ups are rarely all the fault of stores supervisors.

Destination: From the outset there must be at least some decision regarding the starting and finishing points of the expedition, if only to establish the feasibility of transport and timings.

1.2 ADMINISTRATION

Whereas Preliminary Planning deals with important general matters about the timing and location of an expedition, there then follows a second, more detailed, process of administration once the decision to go ahead has been taken. This includes:-

Notification: Give all members of the party written notice of the relevant dates, times, costs, equipment needs, etc.

Permission: Ensure that parents have seen and agreed the arrangements and costs, and have completed a Parents' Consent Form covering this activity. Write or telephone for any access and camping consents that may be required.

Groups: Divide the party (of 4 to 7 persons) into working groups, usually on the basis of tent occupation. These will become food buying and load sharing groups. They should be told what stoves, fuel, mess tins, and tents they will be using, and should be instructed to buy supplies and split up loads.

Fees: Make arrangements with the Company Treasurer or the Officer in Charge of the party for the collection of fees and the payment of equipment hire charges and transport expenses.

Transport: Provide drivers with details of the route they will have to follow, including a map if there is any doubt. Tell them who and what they will have to carry and make sure that the load is capable of being safely and legally carried by each vehicle. Be clear about pick-up points and times. If a minibus is to be used then the organisation will need to conform to the increasingly complex regulations governing both the vehicles and their drivers. Take expert advice on this for there have been recent changes in the law.

Equipment: Where appropriate collect equipment from the central store. Check it immediately and carefully for faults and for completeness. Hired equipment has normally been treated badly by previous users, who often try to hide damage in order to avoid penalties. When you distribute equipment make sure that you have a careful note of who-has-what. When

you return from the expedition this equipment will need to be cleaned, dried, checked for damage again and transported back to the store, where a fee will usually be payable.

Emergencies: Agree emergency procedures and issue route cards to responsible persons who will be in an appropriate position to monitor the party's safe return.

Health: Check for members of the party who :-

- are on courses of prescription drugs, or have recently been ill
- need regular medication (e.g. asthma, diabetes, hay fever)
- have minor conditions that will hamper them such as eczema, athlete's foot, or ingrown toenails.
- have special dietary needs or allergies
- Suffer from severe anaphylactic reaction to stings, or particular foods, and need to carry an epi-pen with them on the expedition.
- are concealing problems such as toothache or muscle damage.



Climbing to Loch Etchachan from the Shelter Stone:
Loch Avon: Cairngorms

1.3 LEADERSHIP

"Being frustrated is disagreeable but the real disasters in life begin when you get what you want"

Irving Kristol

Administration takes a party to the point of departure, which is when *Leadership* takes over. The division between the two is that *Leadership* is an exercise in direct response to ad-hoc situations in the field. There are many aspects of leadership but the following merit special comment:-

Departure: The very first leadership decision will be whether the party should leave home or, having reached the starting point, should then get back into the transport and go home! There will be occasions, especially in the Spring and Autumn, when bad prevailing weather or bad forecasts may mean that the right decision will either be total cancellation, or severe curtailment of the planned programme. There is no harder test of leadership because of the amount of wasted money, wasted effort and disappointment involved, and many of the worst accidents have occurred because leaders could not face up to the need to cancel. Parties who are keyed up for assessment expeditions and those who have travelled long distances, perhaps to Scotland or Wales, are most vulnerable to such dangerous misjudgements.

Timetable Monitoring: Once the expedition has started, the leader needs continuously to re-assess the planned schedule against the actual time that the party is taking. Making changes will normally be preferable to driving a party at a speed that is proving beyond its capabilities, but the effects upon the whole route need careful thought.

Fitness Monitoring: Very early in the course of an expedition the leader has two key functions which, if exercised well, will benefit the whole of the rest of the trip. The first is to make sure that the party starts off at an even and modest pace with which all present are comfortable. There is often an outburst of energy and enthusiasm at the start of a trip when the fit and fast members of the party may break the spirit and strength of their slower and less fit colleagues unless the party leader prevents them from so doing. A second vital function at the start is to make sure that there are no early blisters. Serious problems with feet often arise in the first hour at the start of the first day, due to badly fitting hire boots or bad socks (*see 6.17 P69, and 8.1 Blisters P86*). Especially when dealing with the inexperienced, brief them about the *hot spot* symptoms that they will get from an incipient blister; then ask about foot problems at 15-minute intervals for the first hour and frequently during the rest of the day.



Whatever the consequences for your schedule, stop and enforce immediate plastering of hot spots or other discomfort. The resulting frustration may be very great and the first hour of an expedition with a new young party may see them struggling to cover two kilometres, but **you** should have anticipated that possibility and allowed for it in your route timing. The time needed for blister avoidance is well worth it because it only takes one bad heel blister to imperil your entire expedition timetable, - or even the plan itself.

Simple things are sometimes what matter !

Morale and Discipline:

"...but Band of Brothers they still are, (for) the Captain faces battle alongside.. the ship's company.... Those who command ships in the Royal Navy do not send anyone anywhere. They all go together."

'One Hundred Days' Vice Admiral Sir John Woodward

A leader is responsible for the spirit of his party. He must conserve their enthusiasm, give encouragement when things are not going well and get them to work as a team, but sometimes he must also enforce discipline. Discipline is needed to share jobs and loads fairly, to prevent damage to equipment, to ensure that domestic chores are done well, to protect the environment, to preserve safety and to keep the stronger members of the party from exploiting the weak. With as much good humour as possible a leader must leave his party in no doubt that he is in charge. Discipline problems should be firmly resolved from the very start, for if simple instructions are not readily obeyed early-on, then who knows how the party might react in difficult conditions. But don't forget that if a leader is to be decisive - he must also be right!

Supplies and Equipment Monitoring: There is every possibility that food and fuel may be consumed at rates that were not anticipated. Failures of equipment may also occur. The leader will need to know about such problems as soon as possible and the best way will be for him to enquire regularly of each tent group as to their equipment state and rate of food consumption.

Route and Camp Site Decisions: Weather, rate of progress and the state of the party will all affect the route and the position of camp sites. Changes should always be fully discussed with the party, but in the end, if there is no universal agreement then the leader must decide. Chapter 2 discusses route amendments.

1.4 FOLLOW-UP

The return home is rarely the end of an expedition for its leader. Typically there are expenses to be paid, equipment to be taken-in and returned to the store, and accounts to be settled. Matters discovered during the course of the trip may also

have to be taken further. For example you may have encountered problems of health or temperament, and steps may have to be taken to deal with these.



"The return home is rarely the end of an expedition for its leader."

1.5 RISK ASSESSMENT

This subject doesn't position easily within the manual, for while it is certainly an item within expedition administration - it can't be done until you know the route, - but then again it should be in the back of your mind when planning the route.

Expeditions are an Adventure activity and if you look at the definition in the foreword to this Manual, you will see that an element of risk is implied in almost anything adventurous. So the objective of risk assessment is not entirely to eliminate risk, but to try to manage risk down to a level that is sensible and appropriate for the circumstances of each expedition.

Once you have read this manual carefully, you will have seen that there are only really three main issues in the text, and they are skills teaching, risk management, and risk assessment. Skills are a major element in raising the 'adventure' threshold. Risk-management is then the means of reducing avoidable risks. Finally, once the skills and risk management measures are in place, risk assessment reaches a conclusion as to whether the expedition plan remains on the right side of the dividing line between adventure and undue hazard.

However even if the responsible leader gives sound consideration to all the relevant factors he may still not get it entirely right, - because the required judgements are largely subjective. But by going through a methodical appraisal, gross mismatches between capability and risk will hopefully be avoided.

Follow what it says in Chapters 1 and 2 of this Manual and you will have carried out a comprehensive pre-planning risk assessment/risk management process for any individual expedition. Teach the skills in Chapters 3 to 8, and 10, and you will have considerably raised the risk level at which Expeditions can operate in reasonable safety. Teach Chapter 9 and you will become nicer people!

However it is useful to have a shorthand check-list of key points to help leaders to focus on the key considerations involved in Expedition Risk Assessment. You will find such a check-list on the next page. Risk assessment is nothing new in youth work. Every leader worthy of the name has always instinctively done a risk assessment in his head for every activity, - you just didn't have a name for it!

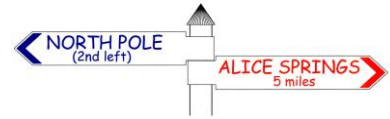
You should discuss your assessment of risk for any expedition with your Company Captain, - but don't try to pass the buck to the Captain, for he/she may not be a qualified expedition leader!

"The Captain didn't object" is not a get-out for you! (I said that)

Ten Crunch Checks in an Expedition Risk Assessment.

		Sign Off?
1	Has a single qualified adult leader taken responsibility for all elements of the assessment listed below, including the decision to proceed or cancel described in (10) below?	
2	Is the route appropriate to both the level of training of the party and its physical capabilities, and is the planned schedule realistic?	
3	Does the responsible leader have advance knowledge of the route and its camp-sites based on previous experience? Otherwise is the party capable of going 'cold' into new terrain, and properly supported for such a venture?	
4	At the proposed date of the expedition, is the range of seasonal weather on the chosen route likely to be within acceptable limits?	
5	Is the physique, health and fitness of the party reasonably consistent, i.e.- without any member who is so very much less capable than the rest of the group that premature exhaustion may place both himself and the party at risk?	
6	Is the equipment and clothing of the party <u>universally</u> up the standard needed for the proposed route? Are all the rucksack loads within tolerable limits and is the party carrying sensible and appropriate rations and amounts of stove fuel for the trip?	
7	Is there soundly-based (adult) confidence that the party will be able to navigate the route safely without getting lost, or if in doubt, will they be accompanied/closely monitored by adult leaders.	
8	Has proper information about the route, participants, and means of contact been left at home, and where appropriate with an independent assessor or supervisor?	
9	Will the party include someone with reasonable first aid knowledge and a decent first aid kit?	
10	Will the responsible adult leader be present on the start line to make a final decision as to whether the expedition should go ahead, - based on a very recent weather forecast, and a check on health /fitness made just before departure? (See Page 10, Sec 1.3 "Departure".)	

Chapter 2: Route Planning



"While the battles the British fight may differ in the widest possible ways, they have invariably two common characteristics- they are always fought uphill and always at the junction of two or more maps sheets."

Field Marshall Sir William Slim

The organisation of an expedition and the planning of its route are inter-dependent exercises. Expedition organisation is a matter of communication, effective administration and the exercise of authority. Route Planning is a skill of hill-craft, knowledge and experience. They overlap in that route planning is subject to the time, transport, cost and purpose set by the organiser.

2.1 CONSTRAINTS

The limitations that form the starting point for any route planner are the following:-

- Transport availability
- The number of days available
- The capabilities of the personnel involved
- The season of the year
- Costs
- The quality of the available equipment

Many of these factors were covered in Chapter 1 especially in relation to factual matters, but there are two important issues that require the route planner to make a judgement. The first is that the route planner must decide the standard of route the party can safely undertake. The second is that he must judge the weather conditions that could occur on the chosen route on the proposed dates (*see 10.1 on P107*). It follows that the route planner needs to know a lot, about the capabilities of each person, about the equipment in use, about the terrain, and about the seasonal weather in the area involved. The less the route planner knows about these variables, the more cautious and flexible should be his route plan.

2.2 PURPOSE

Defining the purpose of an expedition is very important. For example it might be a basic training expedition for young teenagers. It might be a sight-seeing and exploratory trip for older boys. It might be an independent assessment test carried out without immediate supervision. All members of the expedition should know, and have accepted, the purpose and nature of the expedition in advance. Failing to spell out the extent of the effort involved prior to departure can, and does, lead to trouble. There are few worse problems than party members who are constantly undermining the collective effort because they find themselves on a long hard trip that they had not expected.

It would also be as well to add a cautionary note for those who would use expeditions for the supposed purpose of character development, - which traditionally seems to require ritual suffering by those who didn't want to do it in the first instance, - especially common in D of E expeditions! This writer feels that this concept is deeply flawed. Expeditions should always primarily be a form of recreation and enjoyment. Those who perform best will not necessarily be the brightest, strongest or best in any general sense, but simply those who are at ease with what they are doing, and therefore have a good mental attitude. If the going gets tough only those who are reconciled to the demands will do well. On the other hand everyone has to start somewhere, and many boys go on their first expedition just to see what it is like. On that vital first trip, which may well determine whether they ever want to go again, we have a special obligation to seek interest, variety, scenic quality and enjoyment, if the weather will allow, because:-

"You never get a second chance to make a first impression!"

2.3 TIME AND EFFORT

Timing: All parties walk at different speeds and there are big variations between laden and unladen groups and between older and younger teenagers. Timing rules can therefore only be a rough guide and a leader must judge the appropriate speed for his party from experience. Don't under-estimate the variation that different types of terrain can cause in the time taken for theoretically identical distances and heights, and if in doubt, - be generous, for expeditions are not a time trial and the main purpose of a timing rule is to set a starting time which will ensure an adequate allowance of daylight for the journey. Only one timing rule is given here, and it applies to young, laden teenagers.

The advice provided here relates to the capabilities of typical 14 year old boys carrying full expedition packs.

Average Pace:----- 15 minutes per kilometre of flat distance.
 Allowance for height:----- 15 minutes per 100 metres of height climbed
 Meals and Rests:----- Add 20% (*More for young groups*)

Example: A route of 16 kilometres rising through 400 metres in height:

Time for the flat distance (16 x 15 mins.)-----	4 hrs 00 mins.
Time for height climbed (4 x 15 mins.) -----	<u>1 hr. 00 mins.</u>
Sub - Total -----	5hrs 00 mins.
Add times for meals and rests (20%)* -----	<u>1 hr. 00 mins.</u> (<i>* Allow 25%,- or more, for young parties.</i>)
Anticipated total time for the journey -----	<u>6hrs.00 mins.</u>
Add a contingency daylight allowance (6 hrs x 50%) ----	3hr. 00 mins.
Minimum Total Daylight Requirement -----	9hrs 00 mins.

Distance alone is an inadequate way of measuring the maximum amount of effort that a party should make in a day. Height must be taken into account because it costs extra energy and time. The simple timing rule above allows the same time for walking 1 kilometre of flat distance and climbing 100 metres of height, and for the purpose of assessing effort by *laden* parties it is recommended that 100 metres height and 1 kilometre of flat distance should be seen as being roughly equivalent. This works reasonably well except when the day is mainly climbing, in which case the party will tend to arrive early. Conversely, if the day is nearly all flat distance then young parties will tend to arrive late, - so adjust for that. Thus you could argue that the rule can usefully be modified. If that's your view based on extensive experience, - then go right ahead! But keeping the rule simple has its merits as well. Remember that expedition work is not a race, so be generous with timings if in any doubt. Exactly what is the problem if you arrive ahead of the predicted time anyway?!

Daily Effort: The basic measure of any day's effort should be the number of notional "flat kilometres" to which any route will equate when the height climbed has been converted into the equivalent flat distance. For example:-

10 kilometres flat plus 600 metres climbed	=	16 flat kilometres
7 kilometres flat plus 900 metres climbed	=	16 flat kilometres
14 kilometres flat plus 200 metres climbed	=	16 flat kilometres

If each day's effort can be compared to a notional number of "flat kilometres" then it becomes important to know how many of these so-called "flat kilometres" amount to a sensible day's work. Once again the capabilities of parties will vary widely and in this instance the daily effort guidelines have again been set for typical 14 year old boys.

Daily effort guidelines also assume that the party has adhered to the basic advice that the total weight of a boy's load should not exceed 25% of his body weight. This is an exceptionally demanding target for immature young beginners (*like those on page 76*) who will, in many cases, find the 25% rule impossible to follow, - in which case the amount of effort they have to make in a day should be kept well inside the guidelines given below.

Daily Effort Guidelines:

1. A party undertaking an expedition of 3 days or more of continuous backpacking, with each person carrying a total pack weight of 14 to 17 kilos.

Recommendation : Not more than 20 flat kilometres per day, or its equivalent when allowing for height. Allow at least a half day's rest every fourth day.

2. A party undertaking an expedition of 2 days of continuous back-packing, with each person carrying a total pack weight of 12 to 15 kilos .

Recommendation : Not more than 22 flat kilometres per day, or its equivalent when allowing for height.

3. A party undertaking a 1 day expedition with each person carrying a light load of only 5 to 7 kilos.

Recommendation : Not more than 25 flat kilometres per day, or its equivalent when allowing for height.

Daily effort guidelines are the means by which a route planner may judge the effort which his party should undertake in any one day. If the route consistently exceeds the appropriate guideline for the party that is involved, then alternative camp sites should be sought to shorten the individual days and extend the time taken to complete the journey. If the number of days cannot be extended then the route planner must select another route. The above guidelines have been well tested in various mountain situations and have proved generally valid for the 14 year old age group for which they are intended, but try not to plan repeated days at the maximum allowable level of effort. Above all take account of the physique of the particular boys who are actually going to have to do it, - and remember the very true old adage that:

'A convoy can only go as fast as its slowest ship!'

2.4 UNDERFOOT CONDITIONS

In practice, routes of apparently equal distance and effort can vary greatly in the time taken and the energy consumed, depending on the underfoot conditions encountered. The following simple guidelines should enable most of the main problems to be avoided.

- Tared roads make bad walking routes. They present traffic risks and often cause bruises and blisters on the feet. This happens because roads are too even and too hard and this concentrates pressure at particular points on the feet.
- Unsurfaced vehicle tracks and hill paths generally present the best routes and can often be covered at a good pace, although hill paths through bouldery terrain can be slow and hard on the muscles.
- Low lying trackless terrain is often bad ground.
- High ground can be very good going in good weather, especially the crests of rounded ridges.
- Extensive flat areas at high level are often marsh or peat bog. Slack drainage areas at watersheds are invariably very wet.
- Boulder fields and scree slopes are exhausting and present high injury risks. Traversing steep hillsides diagonally is most likely to expose you to such slow and difficult ground.
- Deep heather is very tiring and commonly found on the rolling drier hills of the Eastern Highlands, Dark Peak and Brecon Beacons. Ridge crests are often free of heather, but hillsides and valley bottoms can be thickly covered. Camp sites are hard to find in areas of deep heather and the risk of moor fires is a serious threat. Tick risks are also higher in heather and bracken.
- It is generally very bad practice to plan a route which has more than 30% of the day's effort located on trackless ground unless the route planner has recent direct experience of the journey.

2.5 CAMP SITES

"The trick of successful walking, I always say, is knowing when to stop."

Bill Bryson

The basic pattern of movement within a route plan is dependent not only on distance, effort and underfoot conditions, but also on the position of suitable overnight stopping places. These are usually camp sites but can sometimes also be huts or hostels. As far as camp sites are concerned, the detailed location of a tent is discussed in Chapter 5, but Route Planning needs to identify general locations within which reasonable sites are sure to be found.

Remote Country Sites

Permission to camp is generally not a great problem within the higher and more remote mountain areas, and water supplies are generally unpolluted. In such areas the main difficulties are associated with finding flat dry ground which will take tent pegs, and with the risks caused by exposure to extreme weather. Even in summer, adequately sheltered sites are largely restricted to valley or corrie locations below an altitude of 600 metres. Sizeable valleys with no obvious habitation will usually offer some reasonable possibilities. It is important not to commit the party to camping at high and exposed locations in remote country, *(unless you are very sure of the weather forecast)* for if a storm should flatten the camp in the night then the party would be at great risk. Check in advance when in doubt about the availability of camp sites, or ask others who have been in the area. Never send unaccompanied boys to camp at a chosen location if you do not know, for sure, that there is an adequate site at that place.

Sites near Settlements

Finding campsites near inhabited buildings or on farmland presents different problems. The ground surface will often be suitable for camping, but landowners will normally object to wild camping on their land and streams will often be polluted by sewage or farm chemicals. It is very bad practice simply to arrive in an inhabited area hoping to find a camp site. If there is a need to camp close to a village or a farm then it is essential to check the availability of a site in advance and obtain clear permission. Many larger villages have formal camp sites which levy charges and these should be used if they are available. This will eliminate rubbish and toilet waste problems, and make a contribution to the economy of rural areas. You should also refer to Chapter 9 which discusses the question of access.

- 2.6 NAVIGATION AND SAFETY:** Route Planning decisions can build margins of either risk or safety into achieving the same ends. The main risk is associated with the way in which a route will perform if bad weather strikes at any point on the journey. In particular, routes across high ground have to be assessed in the light of their suitability for safe compass navigation. (*see Chapter 4*). For unaccompanied boy-expeditions, easier bad weather alternative routes must always be available and must be identified, - but don't forget that simply going back can be such an alternative. Another risk is from the obstruction of a route by flooded streams. After one bad storm even quite small watercourses in mountain areas can become dangerous. Crossing flooded streams is a hazardous business and few ordinary hill walking parties are equipped or trained to deal with this special problem. It is therefore important to avoid planning a route that involves the fording of major streams at points where there is no safe alternative, and where a long detour would be involved to find a safe route. Plan routes so that they follow the main drainage patterns wherever possible, and make major crossings at bridge points. (See Section 5.12 Page 57.)
- 2.7 ROUTES FOR ENJOYMENT:** Nobody follows a route for the sake of so doing, - or at least they shouldn't! There must be some benefit in mind, and whatever the limitations imposed by other route planning considerations, there is little point in producing a route that is acceptably safe, balanced, well organised and easy for staff to supervise, but that has forgotten its original purpose or simply failed to fulfil it. If the party came to climb mountains then the route must climb mountains. If the route is part of a long distance transit then presumably it should not climb mountains if it can avoid them! Above all a route must be varied and interesting, for no one enjoys bumbling around in the back of boring-old-nowhere just because it happens to be the right distance and effort. When student leaders are being trained at Brigade courses, -this is one of their most abiding sins! When a technically sound route has been worked out, give it the acid test of purpose and enjoyment - and if it fails that crucial test, start again! Check the parallel BB Expedition Publication called "Routes" for examples of how to construct expedition routes.
- 2.8 PLOTTING AND RECORDING:** A route must be recorded in writing, not only for reference by the route planner, but also so that a route record can be left in the hands of someone outwith the party who will be watching for their safe arrival. This is done by means of a Route Card, an example of which is shown on the next page.

For further route planning advice related to Scotland, see the parallel BB expedition book called "Routes" downloadable as a pdf from Google. Just type in "[Expedition Routes Booklet:The Boys Brigade](#)."

This sheet shows the layout of an expedition route card. It is only of proper value when a copy has been left behind with some responsible person who is watching for your timely return. The route shown is known as Jock's Road and can be found on 1:50,000 sheets 43 and 44.

DATE OF THE ROUTE ON THIS SHEET: *Saturday 11th May 2019* **PARTY FROM:** *1st Anytown Company: The Boys' Brigade*

From	Grid Ref.	To	Grid Ref	Distance	Height	Time	Mag bear.	Description
Glen Doll	284762	Path Junction	268760	1.75km	50m	34mins.	----	From the car park
Path Junction	268760	Forest Gate	248767	2.25km	120m.	52mins.	----	Through the forest
Forest Gate	248767	Shelter	233778	2.0 km.	300m.	75mins.	314	To Davy's hut
Shelter	233778	Ridge Hollow	228793	1.5 km.	120m.	45mins.	355	Turn at the end
Ridge Hollow	228793	Boundary	218804	1.5 km	70m.	32 mins	324	D.R. turn at the end
Boundary	218804	Glen Callater	210807	1.0 km.	Nil	15 mins.	304	Dog-leg in path
Glen Callater	210807	Callater Lodge	178844	5.0 km.	Nil	75 mins.	----	Path down the glen
Callater Lodge	178844	-----	-----	-----	-----	-----	-----	Night stop

Total Route ----- **15.0 km.** -- **660m** -- **5hrs 28 mins** ----- **equivalent to 21.6 flat km**

Meals and Rests(add 20%)----- **+ 1 hr 05 mins.**

Expected Total Journey Time-----**6hrs 33 mins.**

Contingency Daylight Allowance (add 50% to the total time)-----**+3hrs 16 mins.**

Latest Start Time before Sunset ----- **9hrs 50 min**

Emergency Mobile Phone with the Party: David Black 0770 222 7955: Not switched on except in emergencies.

Names and Home Contacts of the Party

David Black	6 Hill Street	Anytown	Tel. 593834
Fred Smith	33 Brown Street	Anytown	Tel 591673
John Gray	17 High Street	Anytown	Tel 592635
Alan White	51 Station Rd.	Anytown	No telephone

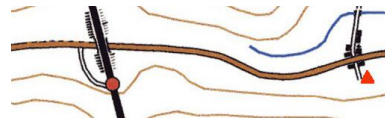
Bad weather alternative routes

Before 233778 return to Glen Doll
 After 210807 complete the route
 Between 228793 and 218804 there is
 a possible exit via Bachnagairn

Chapter 3: Map Reading

*'Don't blame me' replied the Marine, 'we've been through hell more than you:
We are faced with the most dangerous thing in the world.' 'What's that?' asked the Para.
'An officer with a map' replied the Marine glumly.*

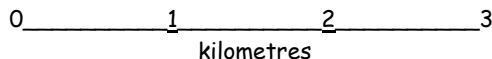
Robert McGowan and Jeremy Hands



A map is a series of symbols drawn on a sheet of paper to illustrate the location of places and features on the ground in such a way that it becomes possible to navigate from one location to another.

3.1 SCALE: The difference in size between real features on the ground and the size at which they are shown on the map is called "Scale". On most maps scale is shown in one or more of the following ways:-

Line Scale:



Statement:

Two centimetres represent one kilometre

Representative Fraction:

1:50,000

All three examples above represent the same actual scale and could all be found on the same map. Line Scale and Statement Scale are obvious in their meaning, but the Representative Fraction, (often shortened to R.F.) perhaps needs a little more explanation. In a Representative Fraction, the unit of measurement is always the same on both sides of the fraction. So a Statement would convert to a representative fraction as follows:-

Statement----- Two centimetres represent one km.

So what does 1 cm. represent?----- 1cm. represents 0.5 kilometre=500m.

Convert both sides to cms.----- 500m. x 100cm.(per metre) =50,000cm

So what is the R.F.----- 1:50,000

3.2 SYMBOLS Little or nothing drawn on a map used for an expedition can be an accurate copy of the feature it represents on the ground. Symbols called *Conventional Signs* are used to simplify the form of the map. These are shown in the map key and have to be learned.

3.3 DIRECTION Maps show direction by being aligned with North. Unfortunately the term "*North*" is complicated by technical problems and navigators have to be aware of three different kinds of North.

- **True North:** The axis of the earth's rotation is used to define the True North and True South Poles. All maps try to relate to True North but in practice they rarely succeed in doing so precisely.
- **Grid North:** Maps show the spherical surface of the earth on a flat sheet of paper, and it is not possible to do that without distortion. So Grid North, - called after the grid lines provided on most maps, is the closest to True North that the map can get. It is against Grid North that practical navigation is actually done.
- **Magnetic North:** A compass does not point to Grid North or True North, but to a slowly moving point of magnetic attraction currently located off North East Canada. In 2020 Magnetic North is only fractional different from Grid North when viewed from the U.K., but that will change over time. The actual amount is specified in the map key, but be wary of when the map was printed. (Also see Chapter 4.)

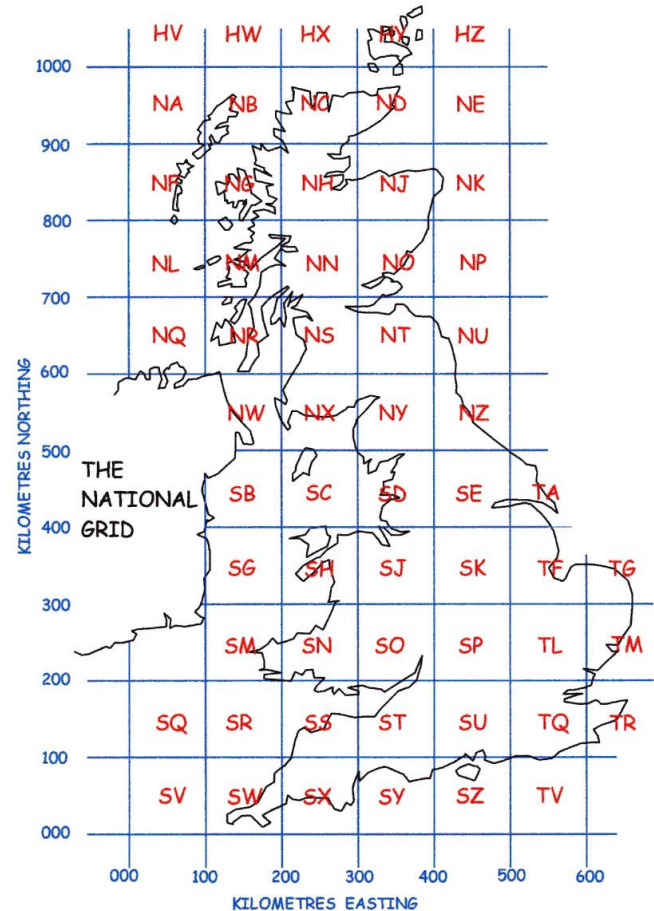
3.4 TYPES OF MAPS

Not all maps are suitable for expedition use. The Ordnance Survey used to be the only provider of suitable maps for UK Expedition purposes, however a few new providers have come into the market with reputable products, perhaps especially 'Harveys', which has pioneered waterproof maps, and provides a range of tourist and route guidance information on map backs. However the new Ordnance Survey 1:25,000 Explorer series is also a major step forward, especially for Expeditions in difficult and complex country. The two standard map series with universal coverage of the UK are:-

- **OS 1:50,000 Landranger Series:** The standard maps for most expeditions
- **OS 1:25,000 Explorer Series:** These more precise maps are useful on difficult terrain, and may come to be seen as the standard.

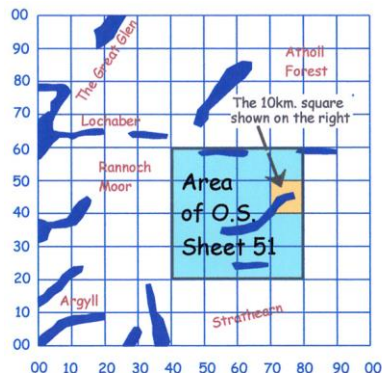
3.5 POSITION

The Ordnance Survey developed a means of describing any location in Great Britain, by using a code of letters and numbers called a *Grid Reference*. Such a system works by dividing up Britain into squares forming a grid. A network of 100km. by 100km. squares covers the whole country and each of these major squares has a 2-letter code as shown below. It allows anyone to establish a vicinity within Britain. For example a reference in Kent might start off with **TR** - and not **NG** which would be in Skye or Applecross.

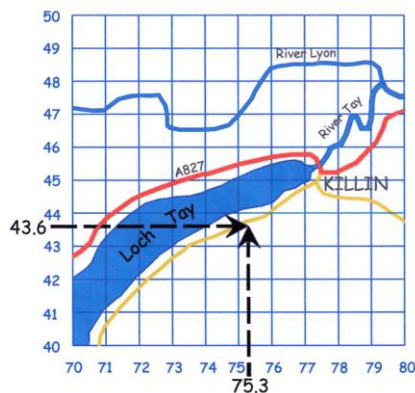


Once the letter code has given the locality within Britain, a more accurate position is obtained from a number code which divides each of the letter coded 100 km. squares into single kilometre squares. This is shown on the diagrams below. Notice firstly that the 00/00 point is in the South West corner of each 100km. square, and secondly that the individual map sheets do not correspond to the edges of the 100km. grid squares.

100 kilometre square "NN" showing the location within it of O.S. Sheet Number 51



A detail showing a 10km. x 10km. square from within 100km sq. "NN" and Sheet 51



All 1:50,000 scale O.S. maps are divided up by a faint blue grid of 1 km grid lines and a heavier blue grid of 10 km. lines. The lines are numbered and these numbers are the single km. sub-divisions within one of the 100km major squares. If the map contains horizontal or vertical "00" lines then the sheet lies across the boundary of two 100km squares, and different reference letters will apply to different parts of the map. As an example of how to obtain a reference on a 1:50,000 scale map, follow the example below by referring to the diagram on the left.

First use the grid numbers along the top or bottom of the map to find how far eastwards (*from the west edge of the 100km square*) is the position for which a grid reference is needed. Take a note of that distance in kilometres and decimal parts of a kilometre (*from the west edge of the 100km square*). In the example shown above-right the position is 3/10 of the distance from the 75km line to the 76km line and therefore has the code 75.3, or 753 because the reference does not show the decimal point.

Secondly use the grid lines along the East or West sides of the map to find the northward distance of the point from the south edge of its 100 km square. In the example shown the position is 6/10 of the way from the 43 km. line to the 44 km. line. It therefore has the position code 43.6 or 436. The full map reference is therefore NN 753436.

This reference when it includes the letter code is a unique reference within Great Britain. A 6-figure reference is accurate to a tolerance of 100 metres. On larger scale maps references of up to 10 figures can be accurate to 1 metre.

Note carefully that the West-East reference always comes before the South-North reference

3.6 LANDFORM AND HEIGHT

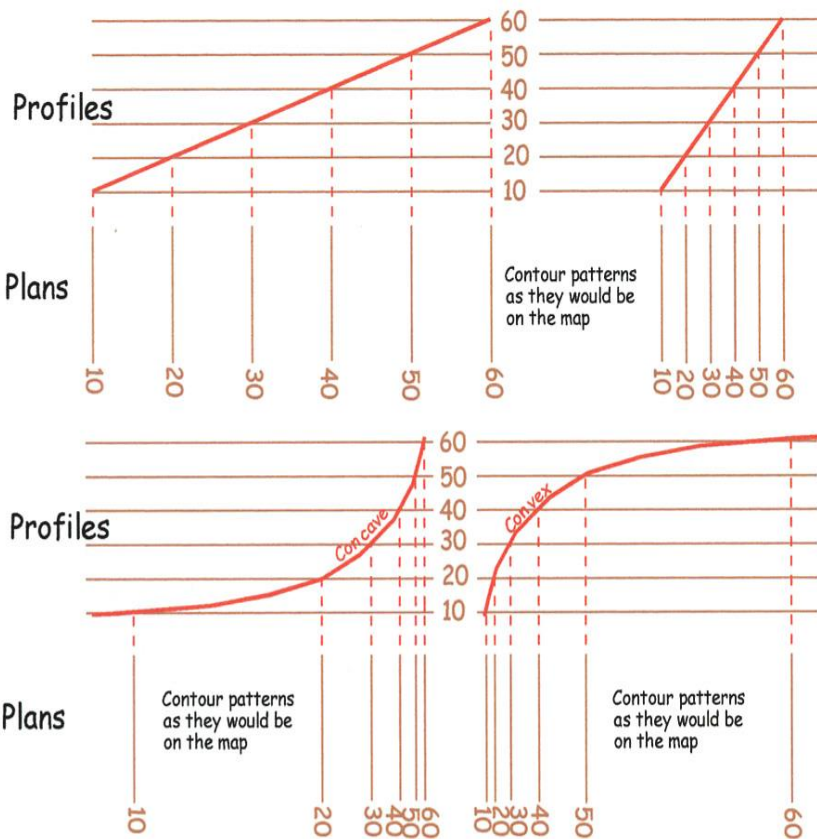
There has to be an artificial means of showing the height and shape of the land if a map is to be of any value for expedition purposes. "Relief" is the term used to describe such information and most expedition maps use a number of ways of showing relief as follows

- ***Hill Shading:*** This technique adds imaginary shadows to slopes on a map that would be in the shade with the sun in a certain position. It can bring realism to other techniques but is inadequate on its own, and the shading can obscure detail and make the map more difficult to read. This technique is not universally employed.
- ***Hachures:*** These are long narrow triangles drawn to run straight down any slope. On O.S. maps they are used to show steep earth banks and the embankments and cuttings of roads and railways.
- ***Spot Heights and Triangulation Stations:*** The simplest means of showing height on a map is to mark a point and show its altitude beside it. This is called a spot height and it is found in two forms on O.S. maps. A simple spot height is marked by a dot, and locations where there actually is a survey pillar (known as a triangulation station), are marked on the map by a blue triangle with a dot in the centre. The pillar which you will find at a triangulation station is usually white and about 1 metre high
- ***Contours:*** The most important, most complex and most accurate way of showing the shape of the land is by the use of lines called "*contours*". This is the principal technique employed by nearly all expedition maps.

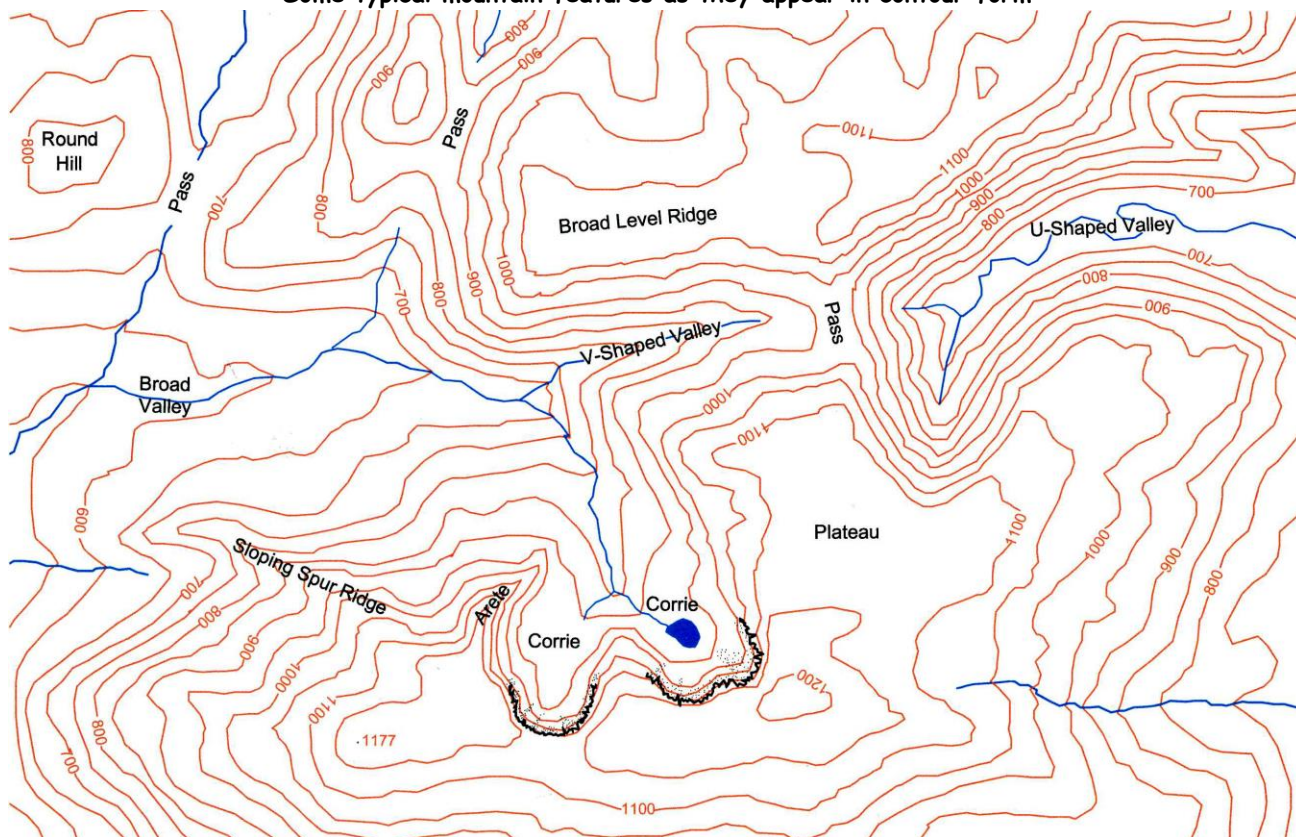
A Contour is a line drawn on a map to represent the surface of the land at a constant height above sea level. Contours do not have a beginning or an end, and never join on to other contours, although they can lie directly above each other at a cliff and may *appear* to join. Contours are drawn on a map at constant vertical intervals, but be warned that different map series can employ different contour intervals. Always check!

The lowest of all contours is the sea coast itself. The tide line retreats around headlands and advances up inlets and estuaries, and the tidemarks of low and high water each draw their own separate contours around any land mass. The Ordnance Survey has defined altitude zero as being the average or mean height of the sea at Newlyn in Cornwall.

Because the vertical height interval between successive contours is constant, one of the most important points about contours is that the horizontal distance between contours on the map can be used to judge slope shape and slope steepness. The closer the distance between contours on the map then the steeper will be the slope of the ground.



Some typical mountain features as they appear in contour form



3.7 ANALYSING RELIEF ON THE MAP

It can be very difficult for beginners to understand the form of the land shown on a map. The wealth of information given can best be unravelled by a methodical approach. Try this process:

Step 1: Appraise the General Situation:

Don't make the mistake of trying to understand detailed relief until the general form of a wider area is understood. Open up the map and look broadly at the colours and forms which are most prominent. Look for areas with a high density of brown lines indicating a lot of steep (*but not necessarily high*) ground. Look for areas of the map which are white with the absence of contours indicating flat (*but not necessarily low*) ground. Check on the amount of surface water. Are there a lot of streams indicating high amounts of run-off water? Are there a lot of small lakes and ponds implying wet and badly drained land? Check on the location of the main valley and river systems. Scan swiftly over the map as a whole looking at the spot heights on the summits and high points. That should give you a good overall feel for the general landform. At the end of Step 1 it should be possible to identify the main areas of high-ground on the map, the main drainage system, the main communication system and the settlement pattern.

Step 2: Narrow Down the Search:

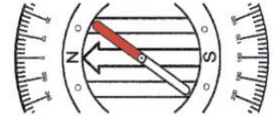
Now concentrate on the area which is of special interest to your expedition. Get a clear understanding of the mountain landforms and the drainage systems in the area. Trace out the valley systems; mark the peaks and ridges; mark the passes. Look at the system of footpaths, roads and bridges. Use all of the information available including names, symbols and colours: - It isn't cheating!

Step 3: Look Closely at the Detail:

Study the contour pattern along your proposed route and make sure you understand what it means. Always check the height of the contour lines and the direction of the slope for it is easy to confuse uphill and downhill. Try to visualise what the ground will look like as you walk along the route. Look for hidden problems and be sure that you know in which direction each cliff faces. In the modern context, -and if you can afford it, Ordnance Survey maps loaded on a PC in "Memory Map" offer a quite stunning 3-dimensional tool for the understanding of contours and terrain, both as a teaching aid and as pre-departure preparation study before you leave home.

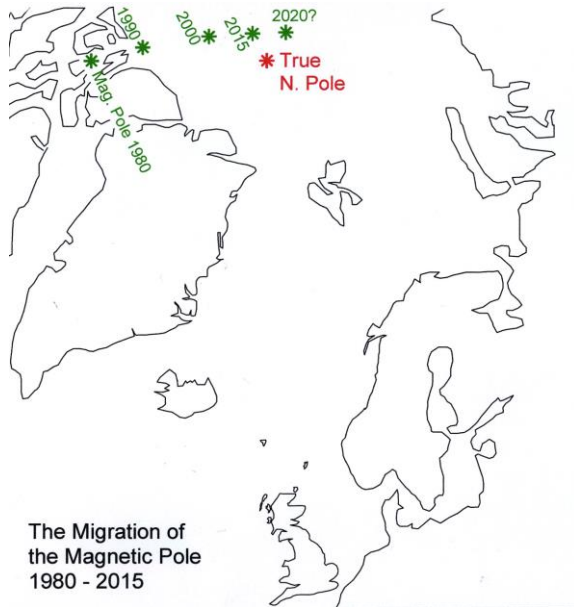
Chapter 4: Compass Navigation

".....Major Martinez, like Columbus, although not necessarily lost, was not entirely sure where he was, or when he returned, had been."



David Brown

4.1 HOW A COMPASS WORKS:



A magnetised iron needle, balanced on a sharp point will always come to rest facing the same constant direction, regardless of where on the planet that needle might be located. Since all other directions can be expressed as an angle in relation to the constant direction of the compass needle, the compass together with a protractor becomes an effective and reliable navigation device. In the modern context there are now also electronic compasses, - even in mobile phones, which are much less reliable and not currently to be trusted!

4.2 MAGNETIC NORTH:

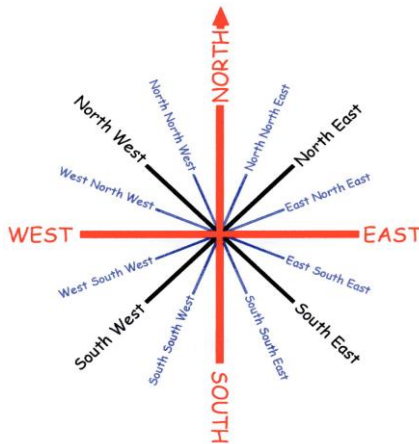
The constant direction in which the compass points is towards the Magnetic North Pole, which is not located at the True North Pole, but is as shown in the picture on the left and constantly (*but slowly*) moving. This means that the direction in which the compass points is also slowly but constantly changing. The rate of change is recorded in the key of every 1:50,000 map sheet - but beware of when the map was printed!

However the migration of the magnetic pole now means that in South West England it was at zero difference from Grid North (*not quite the same as True North*) in 2015, and will be east of Grid

North by 2020. By December 2020 the West of Scotland will also see zero difference between Magnetic and Grid North, while the East of Scotland will still need to add about 0.5 degrees to bearings taken from Ordnance Survey maps.

MAP ORIENTATION

Because Magnetic North is not constant it cannot be used as the basis of the direction grid on a map, since directions on such a map would become increasingly wrong as time passed. So map direction grids try to base themselves on True North as closely as the distortions of the map projection will allow (*see 3.3*), and in the case of O.S. maps this results in the concept of Grid North. So when a compass course is being derived from a map, a correction must be made between the Grid North on the map and the Magnetic North of the compass needle before that course can be used on the ground. This is achieved by making a correction to the grid bearing angle obtained from the map when working from the map to a course on the ground, and doing the opposite when working from a real course on the ground back to the map. *At 2020 in Scotland that correction may be zero or a very small amount, but keep checking, because it will keep on changing.*



4.3 COMPASS DIRECTIONS

Historically, directions have been known by names known as the '*Points of the Compass*', of which there are 32 - at intervals of 11.25° . For expedition purposes these "points" are not accurate enough, but the most common 16 points shown on the left are often used for general description of directions and their names should be learned.

Direction for the purpose of compass navigation is defined as a clockwise angle starting from North to include any one of the 360 degrees of a full circle. So North is both 0 degrees and 360 degrees at the same time. East is therefore 90 degrees, South is 180 degrees and West is 270 degrees. The angle representing a direction is called a bearing and when a bearing is measured against the map grid it is called a Grid Bearing. When the bearing has been corrected to relate it to Magnetic North it is called a Magnetic Bearing. A Grid Bearing is converted to a Magnetic Bearing in Britain by adding to/or subtracting from the angle that has

been obtained from the map grid (*since the map has been drawn relative to Grid North*). In 2020 Magnetic North is typically between zero and 0.5 degrees west of Grid north in Scotland and so a Grid Bearing (n.b. not a True Bearing) is converted to a Magnetic Bearing by adding between zero and 0.5 of a degree to the angle obtained from the map. But in South-West England in 2020, Magnetic North may be East of Grid North and you may well need to subtract-from rather than add-to the grid bearing that you get from the map. Magnetic declination updates can be found on the internet, but not easily!

Examples:

Grid Bearing from the map for a mid-Scotland location in 2020 = 54 degrees.

So the Magnetic Bearing for the compass = $54 + 0.5 \text{ degrees} = 54.5 \text{ degrees}$

But in South West England it may well be:- Grid Bearing from the map = 54 degrees.

Deduct degrees 0.5 Magnetic correction = 53.5 degrees.

4.5 WORKING A COMPASS FROM THE MAP:

"How can we sail to an island that nobody can find, with a compass that doesn't work?" - "Aye this compass doesn't point north, but we're not trying to find north, are we?"

Pirates of the Caribbean.

A hill walker commonly wants to convert a course obtained from a map into a practical direction that he can follow on the ground. This involves three basic actions which apply to all compasses and all maps. These are:

Obtain the Grid Bearing: The map must be used with a protractor (*i.e. a device for measuring angles in degrees which may or may not be attached to your compass*) to measure the clockwise angle between Grid North and the direction in which the party wishes to travel as shown on the map. Silva compasses have a built in protractor function.

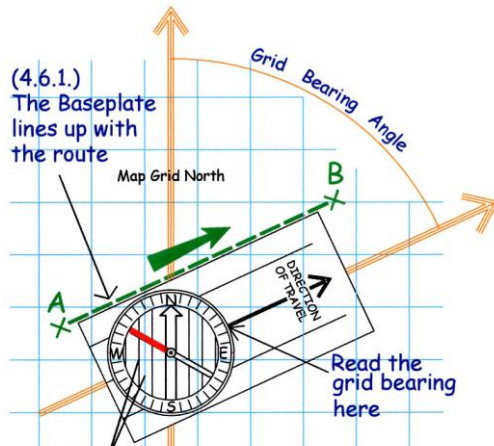
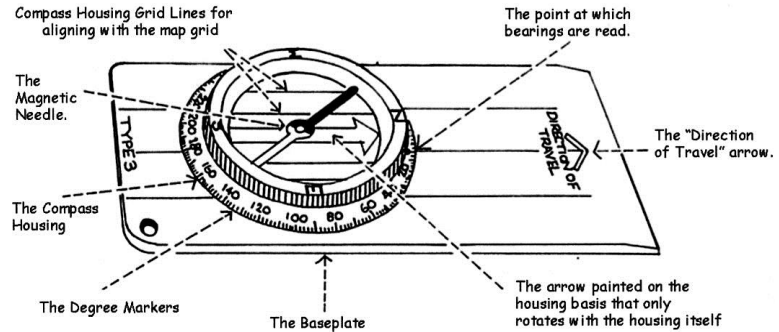
Make a Magnetic Correction: The Grid Bearing must be adjusted to become a Magnetic Bearing by making a correction if necessary. See the information above. In other countries the angle and direction of correction may well be different.

Find the Direction on the Ground: With the compass adjusted to show a magnetic bearing, the whole compass housing must be held in relation to the swinging magnetic needle so as to show the desired direction of travel on the ground.

4.6 THE OPERATION OF SILVA SYSTEM COMPASSES

Most expedition navigation is carried out using Silva System compasses of Swedish origin such as the Type 3 model shown on the right. The process of operating a Silva compass to establish a bearing from the map and then use it on the ground is as follows:

(4.6) 1. Lay the compass on the map with the base-plate edge accurately lined up from the



(4.6.2) The Compass grid lines are lined up parallel to the N-S map grid

start to the finish of the proposed compass route. Make sure that the housing end of the compass is at the starting point of the route and that the long end of the baseplate is at the destination end.

(4.6)2. Hold the compass firmly down on the map, and turn the housing until the grid lines painted on the transparent base of the housing are parallel to the North-South Grid lines on the map. Make sure that the fixed arrow (*painted on the base of the housing*) points to North on the map.

3. Remove the compass from the map and read the bearing angle at the point where the *Direction of Travel* arrow on the baseplate meets the housing. *Establish the amount of the Grid-to-Magnetic correction needed, if any*, and turn the housing until it shows the new number, which has now become a Magnetic Bearing. From this point onwards do not move the housing in any way at all relative to the baseplate.

4. Lay the Compass flat on your hand in front of you, and turn your entire body around while still looking down at the compass until the red end of the swinging magnetic needle is lined up with the arrow painted on the base of the housing. The red end of the swinging magnetic needle **must** be facing towards **North** on the compass housing or the course will be wrong.
5. With the swinging magnetic needle lined up with the fixed housing baseplate arrow, follow the *Direction of Travel* arrow marked on the long end of the plastic baseplate; this is the required course on the ground.

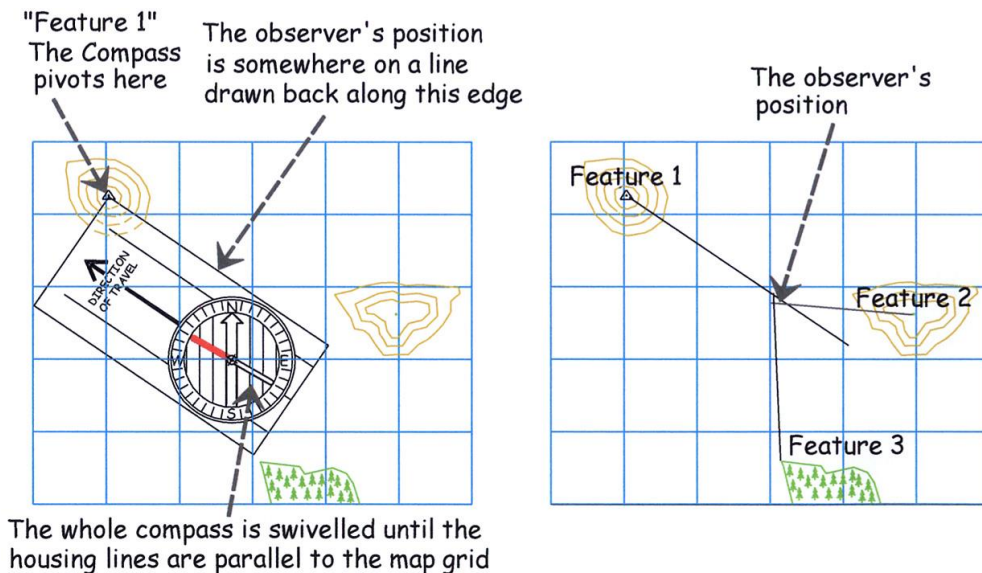
4.7 RESECTION

The process described above covers most normal use of a compass by an expedition navigator. However another occasionally useful skill involves the opposite technique, of working from compass sightings on the ground to fix the exact position of the party on the map. From time to time a party needs to establish its exact position while it is crossing difficult terrain such as forest or heavily rolling ground. If two major landscape features can be positively identified within line of sight, and also found on the map (such as prominent and distinctive hills) then bearings can be taken from sightings on these features accurately to mark the party's position on the map. It is done as follows:

1. Find a pencil and a flat surface on which to lean.
2. Point the *Direction of Travel* arrow on the long end of the baseplate of the compass towards a prominent real landscape feature (which for this purpose we will call *feature 1*). Turn the compass housing until the magnetic needle and the fixed arrow on the housing are aligned with each other, and with both North ends together.
3. Read the bearing angle **and, if necessary**, turn the housing to correct it from Magnetic North back to Grid North and restore the compass to a Grid Bearing for use on the map. This will be the opposite of what you did when working from map to ground.
4. **Now lay the compass on the map** with a forward corner of the long end of the baseplate placed at that point on the map where "*Feature 1*" is shown. With the forward corner of the baseplate pivoting at "*Feature 1*", rotate the whole compass on the map until the compass housing grid lines come parallel to the map grid, (again with North on the compass

and on the map both in the same direction). Draw a line on the map from "Feature 1" back down the edge of the compass baseplate towards the position of the party on the map.

5. Repeat the entire process for one or more other prominent features that can be seen in the landscape, taking care to select features that lie in different directions. The party's position will be where the lines on the map meet.



Note: The process of *Resection* described above is often loosely called "*taking back bearings*", but the term "*back bearing*" properly refers to sightings taken back along a compass course at 180 degrees to the direction of travel, either as a means of retreat or as a check on course accuracy.

4.8 COMPASS NAVIGATION IN PRACTICE

"Never leave hold of what you've got until you've got hold of something else."

The First Law of Wing Walking

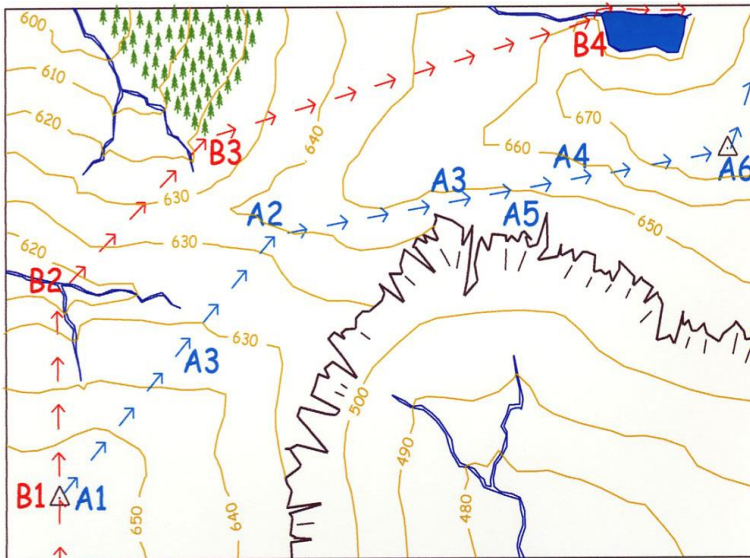
There is a widespread and dangerous belief that the ability to operate a compass confers, on the user, the instant ability to find even the smallest of destinations, on the roughest terrain, and in any sort of weather. Nothing could be further from the truth, for the classroom learning of compass skills is far removed from the reality of the field. This section deals with the field skills of compass navigation.

Choose an objective which is certain to be found. A frequent mistake made by navigators is to attempt to find their way to small objects or vague points on a shapeless landscape. The map and the compass both have substantial tolerances in their manufacture. The compass is just a simple plastic device with an unsteady metal needle, imperfectly operated in difficult conditions, often with gloved hands and with the navigator under pressure from the weather and the rest of the party. The map is a flimsy piece of paper which shows features at exaggerated sizes. For example an ordinary road is about 7 metres wide, but its representation on a 1:50,000 map would scale-up to a width of about 50 metres. So the map position of even a road contains a built-in accuracy error of about plus or minus 20 metres. However good a navigator may be, these inherent limitations do not permit him to be sure that he will find a small hut or cairn in very bad visibility. So aim at large targets that will easily be found in bad conditions, such as a lake, a large wood, a well-marked path, or the junction of strong streams. Avoid blind turns at unmarked points in featureless areas whenever possible and never walk into remote country in bad weather if the safety of the party depends on finding a small object by compass.

Choose a route which can be navigated in short sections with a correction check at the end of each section.

The risks and results of inaccuracy increase with the length of each section of the compass course. 1° of error in either setting or following a compass course results in the party straying 17 metres off-route per kilometre travelled. Nearly everyone makes navigation errors from time to time, so bad weather routes should be designed to permit short sections of compass navigation with frequent opportunities to verify position at prominent features on the landscape. In good weather a route is chosen for interest and ease of effort. In bad weather a route is chosen out of necessity and may involve extra effort to allow the party to travel via easily identifiable points on the ground. In very bad visibility a good compass course

has short straight sections with big clear objectives and angles of approach, which minimise the risks involved in an overshoot past the target.



Route "A" (left): A dangerous route in bad weather because:-

- A1: It turns at a cairn that could easily be missed.
- A2: It turns again at a dead reckoning point.
- A3: The two long sections allow larger errors.
- A4: There is a tendency to drift downhill across the slope.
- A5: If the route is misjudged then the cliffs are near.
- A6: Again the route turns at a cairn that might be missed.

Route "B" (above): A much safer route in bad conditions because:-

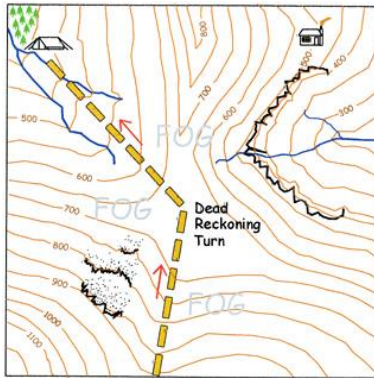
- B1: Even if the cairn is missed the onward track allows the party to overshoot to the stream and confirm its location.
- B2: The stream junction is an easy target and the stream can be followed until the junction is found.
- B3: The corner of the wood is a large, well defined target.
- B4: Again there is a broad target of stream or loch to compensate for any error.

Learn how to estimate distance by pacing and timing. It is possible, within a range of error, to judge distance by counting both paces and time provided that the ground being covered is not too uneven or too steep. This process is known as "dead reckoning" and is a vital skill for use on featureless ground or in conditions of very bad visibility. Dead reckoning is far from precise and should not be used on its own except when there is no alternative. It is important to know the circumstances in which dead reckoning is likely to fail. These include soft snow, scree, marsh, and steep or sharply rolling ground. The basic rules for pacing are:-

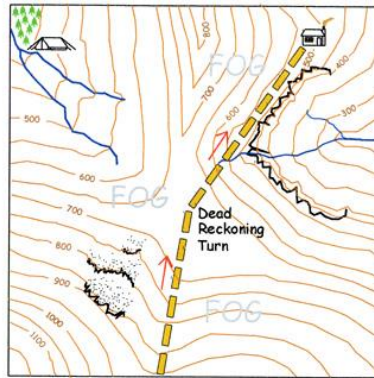
- Count double paces rather than single paces, (*e.g. every time your right foot hits the ground.*) It is much easier.
- Learn your own pacing distances in advance over differing terrains
- Never aim at a small target after a change in direction at a dead reckoning point.
- Get everyone to count paces on each section to provide a cross check.
- Avoid making two or more successive dead reckoning turns. That really is asking for trouble!

In trials over different terrain this author has found variations ranging from 560 to 950 double paces per kilometre. It is essential for each individual to establish his own pacing data over a wide range of circumstances.

Sensible



Asking for Trouble



It is better in most circumstances to use a GPS waymark to clarify your position, - but you have to know dead reckoning technique as a backup.

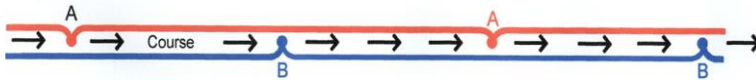
The party leader should also estimate the time required for each section and compare the lapse of time with the progress of pacing. The pacing will almost always be more accurate but elapsed time will be a useful backup.

Develop a precise technique for following a compass course in bad visibility.

Sloppy technique when following a compass course is common among hill walkers and can cause much difficulty. All walkers are vulnerable to subtle influences that cause them to drift off course without noticing, and the only counter to that is meticulous attention to compass work. When crossing slopes diagonally people drift below their intended line; when walking across a breeze people drift downwind, and even when walking on the flat almost everyone has a natural tendency to walk in a curve. Compass courses are rarely needed except in the worst conditions when the navigator will have to work with a flapping map, gloved hands and perhaps driving snow or rain. Such a situation often results in sloppy hasty compass work at the time when accuracy is most needed. When a compass is required it must be used with care, discipline and accuracy, and the worse the conditions the more important this becomes. Occasional glances at the compass create an illusion of accuracy, which is all the more dangerous for its deception. Wherever possible a compass course and its pacing distance should be separately worked out by two members of the party and then followed simultaneously in parallel with each working independently of the other. Any tendency to differ in course and distance can then be identified and checked as soon as it occurs.

There are two basic procedures for following a compass course in bad weather as follows:-

Firstly in ordinary poor visibility the navigator should look along his compass course and pick out a prominent object on the desired alignment near his limit of visibility. This could be a rock, a tree or even a prominent tuft of grass. He should then walk to that object without taking his eyes off it and repeat the process. Navigation in woods needs special care because of the ease with which the walker can mistake his target.



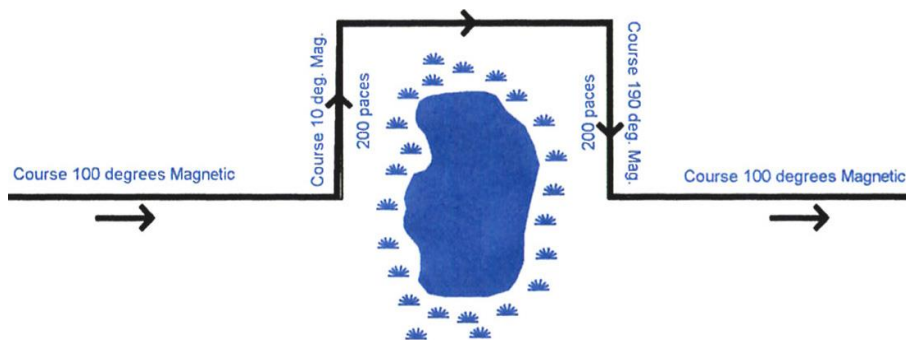
Secondly in very bad conditions, when for example visibility is less than 25 metres, two *compass users* can leapfrog each other, with each using the other

as an adjustable marker at the limit of his visibility. What happens is that one person is sent off on the course with his own compass and is checked by a person further back who is standing still. With instructions from the rear of "left", "right", or "stop", the back marker can position the front man exactly on course and near the limit of visibility/voice contact. The back marker then joins the man at the front and walks past to become the new front marker himself. It has been suggested that torches might be used to signal between front and back markers at night, however torch flashes are very

likely to be interpreted as distress signals and result in the embarrassing arrival of a rescue team. Voice/hand signal contact over relatively short stages is preferable, and torch battery life should be conserved as much as possible.

Learn how to circumvent obstacles on your route.

A party should not come across very large unexpected obstacles if the route has been well planned, but it can happen if there has been new development in the area. The main culprits are new forests and new reservoirs, but unmarked swampy areas and big icefields on east and north facing slopes in the late Spring can also cause unpleasant surprises. If the party encounters a really big obstacle then a radical re-think of the route may be necessary. Smaller obstacles can be circumvented without much difficulty. There are two methods for getting round an obstruction such as a small lake or a little cliff as follows:-



Firstly if it is possible to see all round the obstacle then a member of the party can be sent round to the far side of the obstacle and given instructions to stand exactly on the line of the compass course. The rest of the party can then go round to join him while he stands still.

Secondly, if it is not possible to see the edges of the obstruction then the alternative is to make a 90 degrees turn to the left or right and offset the party to one side of the obstacle until it no longer obstructs the desired course. The original course is then resumed until the obstacle lies behind, after which the party turns back through 90 degrees to regain the original route by counting back the number of paces which were offset in the first instance. Remember to add up all the paces on your line of advance (*but not those at right angles to it*), if your original course involves dead reckoning.

Believe what the compass tells you.

"What am I doing here? This is supposed to be Kansas City" "Maybe you're lost." "'Kansas City's lost, I'm here!"

W.C.Fields ; International House 1933

In misty conditions, strange distortions of landform perspective appear to the eye and it is easy to be deceived, indeed to become utterly convinced that the compass is wrong. The power of the mind to reject the information obtained from instruments is very great, and training in adherence to the compass should be thorough. If inclined to disbelieve a compass course then by all means check it several times and make sure that the compass is not being affected by nearby metal or electronic objects. *(In that context be wary of personal hi-fi's electronic games, and radios.)* However if no inconsistency can be found then the compass must be believed and followed, especially when all the compasses in the party tell the same story.

A very few mountain areas in Britain show magnetic deviations. Parts of Skye and Knoydart are the best known, but there are others. However such problem areas are very few and generally well known.

Don't let your safety be dependent on GPS Navigation alone.

"GPS is susceptible to disruption from such causes as atmospheric effects, signal blockage from buildings, and interference from communications equipment.The (terrorist) potential exists for an individual or organisation to jam GPS or WAAS signals and cause a loss of service over a large area."

US National Transportation Systems Centre /Federal Aviation Administration

The hand held GPS is potentially a huge benefit to accurate navigation, especially in very bad visibility. Such equipment can provide much better navigation than dead reckoning can achieve. But it could make the party dependent on a piece of technology that might go faulty, or have its batteries run out, or lose signal as GPS is inclined to do, or be lost. Then again, as the US authorities have pointed out, GPS is vulnerable to interference and to terrorism. A four-watt hand held jammer can take-out GPS signals over a radius of 200 kilometres! The message is that you must be proficient in the traditional navigation techniques. Then you can add GPS to enrich your navigation performance, but never, never, find your safety dependent on it. The recommended practice is to base your navigation on traditional methods and use a GPS for position updates, and especially for the corroboration of dead reckoning turning points.

Chapter 5: Expedition and Camping Crafts

"After several months of living in tents, if men commit no murder it is entirely through fear of public opinion. Throughout the expedition I should cheerfully have slain every one of my companions at quite frequent intervals but for the need of tiresome explanations to relatives."

W.H. Murray



5.1 CHOOSING A CAMP SITE. This section deals with the issues involved in selecting a wild camp site, assuming that consent to camp on the land is available. The choice of a camp site is largely a matter of common sense. Any tent, no matter how good, is still a small frail device with only a limited ability to withstand attack by wind and water. It also provides no padding at all against uncomfortable ground conditions. The skill exercised in choosing a site will largely dictate the safety, comfort and reliability of the camp. The following points are important in choosing a site:-

Shelter:

Avoid high and wide open places if there is any risk of bad weather. Look for screened locations where the tent will be protected against the wind. Normal practice is to align the tent narrow-end-on to the wind with the door in the downwind position. Facing the door downwind provides important shelter for the entrance. There is one exception to the above advice. Between mid-June and mid-September sheltered Highland sites may become virtually uninhabitable due to the misery inflicted by the deadly midgie, and their avoidance can become the dominant factor in site choice. The most effective counter is to seek a breezy site and to ensure that your tent door does not provide a shelter, perhaps by deliberately facing it across the breeze. Really sheltered camp sites in wet areas and behind woodland are very much to be avoided in such circumstances.

Water and Flooding:

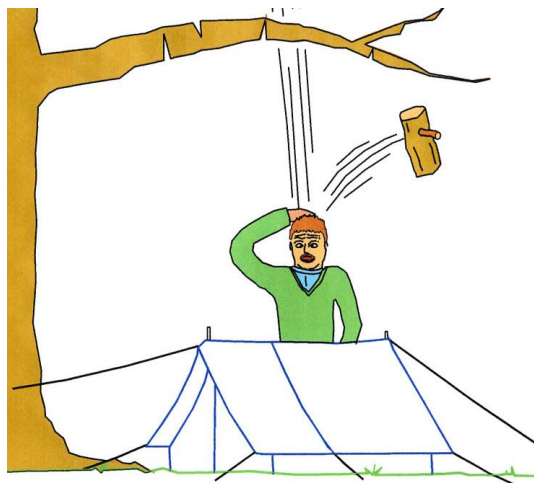
All camp sites use large quantities of clean fresh water and it is essential that a good supply is available close to any site. Such proximity to streams involves a possible risk from flash flooding, so it is inadvisable to camp on narrow ledges or deep in stream gullies. As a measure of protection against fire, the stream serving a camp-site should have a strong flow and be positioned downwind of the tents if at all possible. (*See Appendix E for the explanation.*) The safety of water supplies is also important. A stream bubbling strongly over stones and coming from an uninhabited/uncultivated area will often be safe to

drink because it has been oxygenated and this natural process kills bacteria. Still lake water is generally not safe, even in the case of very remote lakes. Streams within farmland are rarely safe to drink due to animal and chemical contamination. If in doubt you can add water purifying tablets to your water, but this must not be used as an excuse for choosing to use an obviously dodgy water supply, for amateur water purification is slow and far from foolproof. (See Sec. 5.9 for more information.)

Site Surface:

Look for flat soft sites of short grass, but avoid hollows which might fill with water. Any slope will present some problems, and generally a tent should run up and down the slope gradient, but in bad conditions it may be more important for the narrow end of the tent to be aligned into the wind.

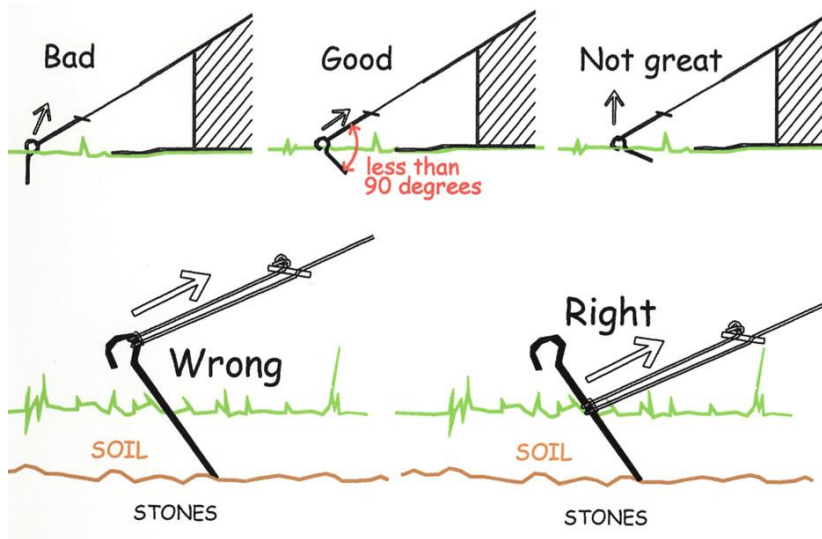
Trees: At a distance trees are a useful windbreak, but they can be a real danger if they overhang the site. If you must camp within falling distance of a tree then take great care to pick a site away from the most obvious fall lines of trunks and heavy branches. Decaying and unsafe trees often have fallen debris below and around them. Do not ignore such blatant danger signals!



5.2 THE PLACING OF PEGS

Pegs are the sole means of securing a tent and their placement decides its strength. The basic principle is that a guy line should be aligned from a tent so that the line of the rope follows a natural continuation of the seam to which it is attached. Expedition tent pegs should never be hit with a hammer or a mallet, (*which you would have to be daft to be carrying anyway!*) Instead they should be wriggled in by hand in order to avoid bending them against stones. Once in place, a peg can be pushed home with a boot heel. The angle into the ground should always be less than 90 degrees to the alignment of the guy-rope, so that the rope does not slide up the peg. Always attach guy-ropes at surface level to avoid leverage on the peg, even if the peg is only partly in the ground.

Good and Bad Practice in the Placement of Tent Pegs (refers to Page 44)



5.3 RUBBISH DISPOSAL

In the countryside much more care is needed in handling litter and rubbish because, unlike cities, there is no disposal service. Cans and paper may eventually degrade, but bottles and plastic will be there for ever. It will help if each expedition party minimises the amount of potential rubbish that it brings with it in the first place. Some foods have many wrappers when only one may be needed. Some foods produce messy and dangerous waste and should be avoided. Reducing wrappings at the outset will also reduce the weight of the load to be carried. All refuse must be brought back to proper disposal facilities and this can be achieved fairly easily if food tins are washed out and then

used as bins in which paper and plastic can be compressed for carrying in the rucksack. The only items acceptable for disposal at wild camp sites are those which are very messy and have a high rate of degradation. Examples might include soggy food waste and apple cores. Even these must be buried carefully away from the camp site and never in or near watercourses. The practice of burying and/or burning rubbish at camp sites must stop, because many sites have become dangerous and smelly due to broken glass, rusting tins and rotting garbage, and their grass cover has been ruined by the blackened circles of camp fires. Do not make camp fires for they are hugely destructive of camp sites and vegetation, and are generally only created for entertainment. They also run a serious risk of starting forest and grass fires.

5.4 LATRINES

The biggest threat to popular wild camp sites is the failure to control toilet waste. This poses a great health risk. The leader of the party should nominate a toilet site for use by the group at a location well away from any running water. In every case a hole should be carefully dug preserving the topsoil and vegetation and it should be reinstated afterwards so that there is no visible damage to the area. Techniques for digging toilet holes should be taught as practical on-site training. Digging holes in tough hill vegetation is not easy and it can need a sizeable knife with a saw tooth blade to cut the edges of a hole through the grass mat, so that a fairly intact turf can be extracted. *However leaving boys in possession of a knife that can do this job poses a serious dilemma between safety and being effectively able to dig a toilet hole.*

5.5 WASHING

Crockery and Utensils: The main problem lies in removing grease from pots and plates. Hot water is usually scarce, but Brillo pads (*because they contain soap*) have been found to be very effective in emulsifying fats and removing hardened deposits even in cold water. They can be individually wrapped in Cling-film and carried on a basis of one per day per tent. Camp cooking tends to result in some very hard deposits which will almost always benefit from soaking the pot overnight. Never wash pots and crockery *in* streams, as this pollutes the watercourse. Instead, remove water from the stream in a pot and wash all items away from the watercourse. Then dispose of all washing and rinsing water on dry land well away from running water.



Personal: It is important that expedition members keep themselves clean because they live very close to each other. Washing in the evening is the best practice since this is when there is spare time and it ensures that the day's sweat is not taken into the sleeping bag. Some sources advise against morning washing on cold days because skin oils can be a vital factor in combating skin cracking in cold conditions.

The North East Corrie of Lochnagar in April

5.6 COOKING

The Bruce recipe...is as follows. Take one sachet of chocolate powder and apple flakes, half a pack of crumbled dry biscuits, a pack of dehydrated chicken supreme and peas, dried rice, and instant tea powder. Place all the ingredients into a mess tin and bring slowly to the boil after adding a pint of cold water taken from a murky pond. When simmering add the rest of the dried biscuits..., and half a dozen Rolo chocolates. Stir with a strong spoon and serve garnished with boiled sweets.

Don't Cry for Me Sergeant-Major. (Robert McGowan and Jeremy Hands)



Expedition cooking is a specialised art which demands skill and experience in the handling of portable stoves which are often temperamental and can be dangerous. It requires cunning in the choice and organisation of meals so that all of the constituents can be brought together warm and ready at the same time to form a meal, even with the availability of only one small heat source. The first priority is the siting and protection of the stove so that it is safe and screened from the wind, - for most camp stoves are quite useless if exposed to any breeze. Cooking outside the tent is easily the best safety practice and should be the norm. Erect a screen of large articles (such as rucksacks) around the stove, but take care not to burn the screen. Always put a lid on a pot except when frying or trying to boil-away liquids for this will greatly reduce the boiling time.

However screening a stove outdoors only works in the case of a light breeze coming from a steady direction. In variable gusting winds, and in cold conditions, gas stoves will usually not work outdoors. Even if they do, they will suffer poor burner performance and massive heat loss from their pots due to wind conduction. As a result cooking times will be very long and rates of fuel consumption will be unsustainable.

Trangia methylated spirits stoves do rather better in bad conditions, but are now **banned from B.B. expeditions for safety reasons**. (See 6.18, Page 69), although the gas conversion of this stove type is good and still approved for use. It is very efficient, - but bulky and expensive.

Bad weather will therefore sometimes dictate that cooking must be done in the shelter of the tent porch. This is a judgement that the party leader must make in balancing the safety risks associated with fire against the safety issues associated with cold and hunger, and it can only be made on that day and at that time. Porch cooking has inherent risks so the cook must be competent and sensible and the other occupants must not clamber in and out of the tent past the stove during the cooking process. When cooking in a tent porch is deemed necessary, ensure firstly that there is generous ventilation to avoid the risk of poisonous fumes, ensure secondly that there is a means of fire escape from the tent that allows retreat directly away from the stove, and ensure thirdly that the stove is kept well away from walls, roof or any 'canvas' that is thrashing in a gale. For tents with a back door as well as front, a fire escape option may be quite easy to arrange. It's a pretty bad idea to cook in the front porch of a single door tent but, if you absolutely must, then get any tent occupants, - other than the cook, into alternative temporary shelter (*such as another tent*). In such a case also consider whether the cooking might be done with the stove inside the porch, but the cook either outside, or closer to the exit than the stove.

The risk of a grass fire being caused by a cooking stove is less obvious, but on some wild sites it can be the main threat. Certain stove designs are inclined to ignite the grass upon which they sit, and the biggest risk occurs when the vegetation is dry, a breeze is blowing and the stove has been left unattended. Even if the ground itself is wet, fire will race through dry plants just above the surface. Every party should keep a well-filled collapsible water bucket handy as both a source of cooking water and as a fire extinguisher, and no one should start cooking until the party leader has given permission and is on hand to deal with emergencies. This particularly applies to cooking inside tent porches and on high fire-risk sites. (*See Appendix E.*)

When buying food think firstly about cooking time and difficulty, secondly about the number of items to be prepared on a single stove and thirdly about the cost, weight, fragility and "rubbish factor" of potential foods. Before cooking, place all of the ingredients, utensils and water required within arm's length of the stove. Cook each item in a pre-planned order to make multiple use of pots and get each part of the dish prepared in co-ordination. Some ingredients may have long cooking times while others may be quite short. It therefore makes sense to do the lengthier cooking first and then prepare the additional quickly-cooked items. While this is being done the items that were cooked first can be kept warm by insulating the sealed pots within a towel or spare clothing. Economy in washing can also be achieved for example, by immediately re-using soup pots for stew or mince.

5.7 BAD WEATHER CAMPING DISCIPLINE

The time will come when a party reaches a camp location in wet weather and at the end of a long wet day, faced by the problem of erecting their tents and occupying them without getting everything wet. These tents will be soaked before they are ready to be occupied if the party does not perform with teamwork and discipline. Firstly they will get wet if their assembly is not, fast, efficient and well organised. Secondly they will get wet if the party occupies them in wet clothes.

Good tent erection practice in bad weather:

The first priority is to get all of the tents erected as nearly dry as possible. The whole party should work on one tent at a time so that each tent goes up in the shortest possible time. Nobody goes off to occupy his own tent until every tent in the party has been put up. Don't take the tent out of its bag until you have identified exactly where it is to go, - and then briefed the party on their individual roles in this high-speed process. Your problem is that the tent inner is not waterproof, so while you are pegging it out on the ground and fitting the poles in their sleeves, - your tent interior will fill with water, and you will find that you have erected a swimming pool!

A few tents are designed to have their flysheet erected first, which is better in such conditions, - but most are not. The process for most tents should be as follows:

1. Designate someone to put the poles together, -someone else to get the pegs out, -maybe two people to open up the flysheet and unravel the lines, -and one person to get the inner tent back into the tent bag and out of the rain as fast as possible
2. Three/four members of the group hold the flysheet stretched out flat above the pitching site, - at about waist height, - as a rain cover.
3. One or two others erect the inner tent under the shelter of the stretched flysheet. Those outside should ensure that the flysheet cover is not pulled out of position, and tip any puddles on the flysheet off to the side.
4. Lower the flysheet into position on the tent and peg it out.
5. Then all of the group goes on to assist in the erection of the next tent! Nobody dodges off until all the tents are up.

In strong wind and rain you will struggle to do this well, -but then you'll struggle with just about any process if the weather is that bad.

Good tent occupation practice in bad weather:

Once the tents are up there is the problem of a wet party wanting to occupy them. The classic error is that the sodden party all occupy their tents in soaked clothes, drip water all over the groundsheet, push against the tent sides causing it to leak, and get in each other's way because there is not room for them all to change at once. Sadly such pathetic performances are very common.

Assume that the tent is now ready for occupation, on a very wet evening, by a party which is itself thoroughly soaked.

1. Open and tie back the tent door (*which should be facing downwind*).
2. Set out all stoves, pots, and food needed for the night within the tent entrance. Fill all pots with water for cooking and place them within easy reach.
3. Ensure that all tent occupants have answered any necessary "calls of nature" before taking off wet clothes to go into the tent.
4. Tent occupants stand or sit in the door porch and, one at a time, empty their dry kit into the tent and then remove their wet outer clothes. Their wet clothes are then placed in the rucksack before each person enters the tent and quickly puts on a few dry clothes.
5. The first persons inside the tent have to provide a light if required and organise the kit of all of the other occupants as it is thrown through the doorway to them.
6. The senior person in that tent group is last-in and is responsible for ensuring that all outside kit is properly stored out of the rain, and that boots are stowed upside down under the flysheet.



5.8 PACKING A RUCKSACK

Badly packed rucksacks are perhaps the biggest single source of difficulty on expeditions. Failure to carry out this task professionally results in discomfort, premature tiredness, vulnerability to water penetration, and sometimes damage to the load. A well packed rucksack is always easy to identify, for it will look compact, evenly shaped, balanced and well protected against the weather. One thing that cannot be emphasised enough is that packing a rucksack means exactly that. Space is at a premium. Nothing can be delicately laid in a rucksack if the space is to be used efficiently. It has to be stuffed in it regardless of how much Mum might cringe at the consequences for crumpled clothes. Expeditions are not a fashion contest!



One of these is all wrong: Go on, - guess which one !

Rucksack packing is a very personal thing and there are endless arguments about the right way to do it. The advice given below is the author's personal view, and he has no objections to alternatives, - if they work!

a. Compartmentalisation: Most rucksacks on the market possess an ability to be split into upper and lower separate compartments, using a zip that goes horizontally across the lower-centre of the back of the bag. Many people therefore choose to put their sleeping bag and a few other items in the lower compartment and the remainder in the upper compartment. This writer thinks that this is bad practice in 60-65 litre sacks for two reasons. Firstly the use of two compartments makes it almost impossible to get maximum use of the total space within the sack as a whole, and secondly the bag tends to end up with a wobbly mid-section. Unzipping the internal divider to make the whole

rucksack into a single compartment of uniform section allows a big, tough, *(-and for that reason often fairly inflexible)* single waterproof liner, to enclose the whole load, which in turn allows the packed bag to be straight, rigid and of the largest possible capacity. This writer is now prepared to give some credence to split-compartment packing having recently started using an 80 litre sack that is too long to reach easily into the bottom of it. Initial experience of 80 litres has been good as it also lets an air mattresses be packed inside the bottom compartment, - in a second rucksack liner of course.

b. Waterproof Liners: All rucksacks need a waterproof liner that is taller and slightly wider than the sack interior, and *extremely* tough. The best answer is a very heavy duty plastic bag. *There are expensive purpose made rucksack liners on the market, but they'll be full of holes after a couple of weekends, and therefore very bad value for money.* On the other hand, plastic dustbin liners are far too fragile. Even the best of them, -such as garden refuse sacks, will rip into holes very quickly. The best cheap answers found so far are the Homebase (large size) and B & Q heavy-duty rubble sacks. (N.B. Not the woven versions). *You can also patch them with Duck Tape.* Distribute two-each to your boys. One is used as a sack liner and the other as weatherproofing for the karrimat, or air mattress, *if it is being carried externally.*

c. Packing Principles: The basic principle in packing a load is to place those items that will be needed last into the bottom of the bag. This generally includes the sleeping bag, changes of clothes, and towel. Heavier and more frequently needed things should then be located increasingly far up the bag. However the key point is that packing must start from the very bottom with a determination to pack the space as tightly as possible, with small items being pressed down into edge spaces. Failure to pack the bottom of the bag intensively simply results in a floppy bag, and difficulty in getting everything into it.

d. Outside Pockets: Most rucksacks have three or four outside pockets, which are the sworn enemies of a well packed load. Boys see it as their duty to stuff everything into bulging outside pockets, and put almost nothing into the main compartment. The result is a hopelessly unstable bag in which almost nothing is within the waterproof liner. Thus a key principle is to put nothing into outside pockets until the waterproof main compartment has been fully built up into a stable shape and load. Valid uses for outside pockets include map & compass, water bottle, snack, sunglasses, etc.

e. Tents and Karrimats: A key reason for needing a well-filled and stable main compartment is that a tent bag containing half of a two-man tent will normally have to be carried across the top of each rucksack, - just underneath the lid. The tent doesn't go inside the rucksack because it is too large, and is usually wet with either rain or condensation. You don't want a wet tent inside your bag! Without a well packed sack the tent will be hard to carry efficiently, and there will be a risk of it sliding out of the load and getting lost. *(So make sure that boys always knot the tent-bag cords securely onto the rucksack.)* Karrimats are best carried on the top of the rucksack lid, -or on the side of a sack that does not have side pockets, - using straps attached there for that purpose.

Also see Section 6.13 on rucksack design, and the illustration on page 66.

5.9 SENSIBLE WATER SOURCING

This is not a matter on which uniform advice can be given for all parts of the U.K., and expedition leaders have to adopt practices that suit the circumstances of their own areas, and which also conform to the requirements of the bodies under which the expedition is being controlled and supervised. The following principles are intended to apply to the Scottish Highlands, where they work without significant difficulty, but water safety issues are often much more demanding in other parts of the UK, and the basic rule is that a party must agree water sourcing procedures with the Supervisor and Assessor of each expedition, to make them appropriate to the particular route that is being followed.

These bullet points give generalised advice regarding principles that may help you to form a sound judgement about when water should be safe to drink. It represents a minimum set of precautions. But in the end the buck stops with your judgement, and with the guidelines you get from supervisors and assessors!

- Water is bulky and heavy and is consumed in large quantities by an expedition group. Carrying enough water for an expedition simply isn't a feasible proposition in terms of either weight or space.
- Water used for all purposes, whether it's the washing of people, the washing of utensils, or cooking, or drinking, - should visibly be of reasonable quality. While safe drinking water is the key issue, you don't then want to pick up an infection from cleaning your teeth or washing your cups and plates in contaminated water.
- There is nothing wrong with public tap water in the UK, and no *safety* justification for using bottled water instead of it. Some UK tap water may not taste very nice, but that's not a safety issue.
- Expedition parties in uninhabited wilderness areas will often want to use raw stream water as their source for all purposes. In the Scottish Highland context this has been the norm for very many years and, - with a display of common sense, it works well.
- The first key yardstick for assessing the safety of a stream as a source of drinking water is that there must be no houses, farm buildings, agricultural fields, or heavily used wild campsites upstream of the abstraction point, - and the stream must not run through intensive animal pasture, which might generate a risk of e-coli. (*The definition of "intensive" would not include a few hill sheep on a large mountain area.*)

- The second and most important yardstick is that the source stream must clearly have been subject to robust oxygenation over some distance and time. The primary means of killing bacteria in water is to expose them to high levels of oxygen from the air. This is achieved when a stream bounces down a hillside, bubbling over rocks and down little waterfalls. A strong mountain stream meeting the two above yardsticks is highly likely to be safe.
- The third key yardstick is to take a good look at the water you have taken from the stream, - and check it for clarity and low levels of particulates. If it looks good and clean, and meets the criteria on wilderness sourcing and oxygenation, then it could reasonably be judged safe. Generally speaking, water which isn't trustworthy will look a little dodgy.
- Another precautionary measure is to favour strong side streams bouncing down hillsides rather than main streams/rivers, - because you can't assess what might have leaked into a main stream from closer to its source, and they are generally less well oxygenated.
- Definite no-no's are the use of slow moving trickles, - or still water from lakes or ponds! Sluggish or still water may look good but it is not being oxygenated and is therefore prone to bacteria contamination. During persistent hot weather when stream water becomes warm, it would also be wise only to use bubbly streams with robust flows.

A well oxygenated mountain stream, which is the sort of ideal raw water source you would like to find

It is up to those conducting D of E Expeditions to agree water sourcing arrangements with their Assessors that are appropriate to each particular expedition.

The bottom-line is that it is bad practice to plan a route through an area where the raw water sources are questionable.



5.10 THE LIMITATIONS OF WATERPROOFING

In working with many leader students and boys on Expedition courses it has become evident that the inexperienced have little grasp of the penetrating power of water into their expedition kit and a naïve faith in the pronouncements of equipment manufacturers about the waterproofing qualities of their products. This section is therefore aimed at giving you a more realistic expectation of what you can expect in practice.

In a typical expedition environment water gets inside your defences from a variety of sources among which the following are most important:-

- Rain, -of course, directly wets the outside of your clothing and equipment, and penetrates most severely when it is driven by the wind, when it may hit you more or less horizontally.
- Expedition ground is often wet and boggy and water therefore penetrates up through boots, and onto legs via splashes. Brushing through long wet vegetation such as heather and bracken on a rainy day also causes water to run down your clothing and legs and in such circumstances it often gets into boots by running down your legs.
- Condensation causes cold surfaces such as tent flysheets to become wet and sometimes drip. During rainy weather when the air is of course very humid, this humidity will even cause dry cotton clothing to feel damp.
- A much under-estimated, source of wetness is perspiration from bodies and from the breath. All human beings emit water vapour, - all the time. In particular they emit it in large quantities when working hard and sweating. Thus if you enclose a person in a waterproof membrane such as waterproof clothing or a nylon tent flysheet, then that membrane will stop body water vapour from escaping - and it will cause clothing inside waterproof garments to become damp, or even wet. A backpacker working hard on a wet day will perspire a lot of sweat inside his waterproofs in the course of a day, much of which will wet his/her clothing. People who spend a whole night inside tents will emit enough water vapour on a cold clear night to cause the inside of a nylon flysheet to be completely soaked and dripping.

You may conclude that the answer to all this lies in hi-tech garments which let perspiration out - but keep rain from getting in. The reality is that despite the expense of these garment and/or the claims they make - their capability in the worst of conditions has been said to equate to removing about a quarter of the water vapour that a body generates. Indeed in the

experience of many people, the difference in performance between high tech "wicking" garments and simple low cost waterproofs seems very dubious value for the extra cost involved.

The message we want to get across is that if the weather decides to do its worst - you are going to get fairly comprehensively wet, and the key thing is to know how you can best limit the damage and avoid the worst consequences.

Damage Limitation:

There are two forms of wetness. One is Warm-and-Damp, and the other is Soaked-and-Frozen. Your objective in really bad conditions is to remain within the Warm-and-Damp category.

The first step towards remaining Warm-and-Damp is to have a full set of genuine waterproofs including a jacket with a big deep hood, - and waterproof trousers. These are not necessarily expensive if you forget about things like Gore-Tex and just go for a directly waterproof coating.

It would also be prudent to have a pair of knee length gaiters, to stop water running down your legs and into your boots.

The next - and very important consideration is what you are wearing under the waterproofs. The villain of the piece here is anything with a significant cotton content. The principal quality of cotton is that it soaks up water:-That's why towels are made of cotton! It also then becomes heavy and is slow to dry: **SO DON'T WEAR COTTON!** The ideal wear is artificial fibre T-shirts, trousers and shirts. Artificial fibre fleeces are particularly effective under waterproofs in very wet weather. They don't get heavy, keep you warm even when they are wet, - and taking them off and giving them a good shake at the first opportunity will restore them to (*what seems like an*) almost dry state very quickly. Once they get wet cotton garments will, in most cases, be wet for the rest of the trip, very heavy to carry, and a nightmare in your rucksack.

The key citadel of dryness that you have to protect is the interior of your rucksack. With good technique you can do this - for no one is sweating inside your rucksack! **NO RUCKSACK IS WATERPROOF.** You need a very heavy duty plastic liner bag or dry bag for your rucksack, and everything you want to keep dry has to go inside that liner and inside the core of your rucksack, - and not in the outside pockets! Then you need to make sure it is decently sealed at the top. The only things that should be exposed on the outside of a rucksack are your karrimat - itself in a heavy plastic bag, and your tent (*under the rucksack lid*). Tents are usually wet anyway and you don't want them dripping inside your dry bag.

5.11 SURVIVING FLOODED STREAMS: In recent times there has been a change in UK weather patterns, with the effect that cyclonic depressions crossing the country during the summer are now deeper and more intense than would previously have been expected. The consequence of this for expeditions is that we now experience individual days of very heavy and sustained rain that can cause streams to rise from placid minor features to frightening torrents in as little as 6 hours. The problem is of course that many expedition routes repeatedly cross un-bridged streams by boulder-hopping. This is normally of little difficulty, but in circumstances such as those described above, a party can easily find itself cut-off.

This advice is not for the purpose of telling you whether or how to cross major flooded streams, - because you might just be daft enough to go and try it without the specialised practical training and equipment that is required. The bottom line is that you should not try to cross serious flood water. Better to camp-up and wait for the water to go down, or choose to walk a long diversion to a bridge crossing - than end up with a drowning! The main purpose of this section is to help you understand the risk elements and give you a basis for deciding what to do. The main problem you face - and this author has seen it in exactly these circumstances, is that boys are all too often gung-ho, and keen to go for risky courses of action in the classic teenage certainty that nothing can happen to them! Those undertaking pass-or-fail D of E expeditions are very likely to be keen to risk it. So perhaps the most important advice is that you, - their supervisor, must be very sensitive to flood risk in situations when there may be a lot of rain, and particularly when intensive rain is forecast for a particular day. In such a situation don't leave it to boy judgement. Get on the scene promptly and take command if streams start to rise rapidly.

Even among adults, the threat caused by flooded streams is often underestimated, so it is worthwhile reviewing some of the key points, as follows:-

The typical mountain stream crossing has a very uneven base of boulders, some of which will be loose and unstable. So the walker is dependent on seeing where he can place his feet on a stable base - and knowing how deep in the water his footing will be. One of the first consequences of rising flood water is that the previously clear stream becomes brown and opaque with sediment as well becoming a lot deeper. So in flood conditions the walker cannot see the stream base, or assess its depth, or know if the base boulders are stable or wobbly. The second major problem is the weight, depth and pace of the water. Flood water doesn't just get deeper - it also moves a lot faster, - and water is heavy stuff - each litre weighs a kilo! So when you step into a torrent like this, you get knocked sideways, - and you have no option but to be standing on one leg

as you take each step. In combination the walker faces uncertain depth and footing, and massive forces driving him sideways, - and of course an immature 14 or 15 year old doesn't have anything like the body mass or muscle mass of an adult.

The main advice when you face flood conditions is firstly to look widely at your map, try to assess the main stream crossing threats, and then look for ways around these, - at bridging points, even if that involves walking a lot further. Be prepared to make radical route decisions in the interests of safety. Even if you succeed in avoiding major streams by going to bridging points you may well still face side streams that will cause problems. If even these are too much of a threat you may have to camp and await either the abatement of the flood - or rescue. People may be out looking for you so make sure that your camp is easily seen and be ready to attract assistance if, for example, a helicopter should appear.

However in seeking to cross flooded side streams - not major torrents, there are a number of possible ways of finding a tolerable crossing point. Firstly, remember that streams always reduce in size as you go uphill. So, if it looks feasible, detour uphill along the stream bank until the flow reduces. Another means of checking the hazard involved in a crossing is to probe the stream bed with a walking pole. The pole will tell you the depth to the stream bed, let you find out how rough and difficult the footing will be, and give you some feel for current force.

Assuming that a staff member wants to test a crossing first, - then walking poles can give support as he tries out the crossing route. Remember that in the absence of walking poles, a good locally-found stick of about 1.25m in length will do the same job. If staff have crossed safely, and deem it a tolerable risk for the boys to cross, the next move might be for the staff to make several crossings back and forward to ferry the boys rucksacks over the stream, and boost their confidence. After that you would expect staff to offer direct physical support and advise boys on footing as they cross. Again poles and sticks would be very useful assets in providing support. Don't worry about soaked feet, - that's the least of your problems! Above all - always err on the side of safety and have the bottle to stand up to pressure from boys for the "brave" option.



The Allt Giraig at Shinagag bridge south of Beinn a Ghlo after one night's rain.
The previous evening you could have walked across it with dry feet!

5.12 STEEP GROUND SAFETY

This advice has been added as a result of several reported incidents with similar characteristics, which have come close to causing serious accidents on steep ground that otherwise looked fairly innocuous, - and where no special threat had been anticipated. The 'ingredients' producing these situations were as follows:

- Steep short grass, or fairly short grass hillsides in wet weather.
- Boys wearing nylon waterproof jackets and trousers with smooth, (*i.e. slippery*) outside surfaces.
- Relatively inexperienced boys who lacked confidence on steep ground and tended to lean into the slope and try to hold on with their hands. Note that you often don't find out that someone isn't good on steep ground until you're actually on it, - which is just a little late!

In the most serious incident of which we have become aware, a 14 year old boy, - not wearing a rucksack and descending a steep grass hillside in the above circumstances, lost confidence and leaned back towards the hillside in order to hold on with his hands. As a result of this the angle of contact between his boots and the slope, was altered from the sole to the edge of the wide smooth rubber rand around the lower half of the boot (*now common on fabric Gore-tex boots.*) He then slipped on the wet grass, landed on his back upon his shiny waterproof jacket/trousers, and 'tobogganed' quickly down the hillside quite unable to stop himself for around 150 metres before coming to a halt on flatter ground. Happily he emerged more or less uninjured but the potential for serious injury was obvious particularly since there were several bands of scree on the slope. An important secondary effect was that the rest of the boys in the party - confident enough until then, suddenly became very nervous when they saw this incident. Managing them then became the big issue.

The lessons to be drawn from the above situation, and others that have been reported, are as follows:

1. Think carefully before committing a party to a steep grass slope if the prevailing conditions conform to the bullet points above.
2. Don't take a party onto a steep slope until you have done specific training in steep ground technique. (See the next page.)
3. Make a point of observing beginners for signs of nervousness on exposed ground. You'll be surprised how it sometimes affects otherwise robust boys, who will try to hide it because they don't want to look 'soft'.

4. The risk element reduces sharply if matt fabric/wool outer clothing is being worn, or if the party is descending heather or stones. The latter may carry other risks, but you won't slide far, and it's speed that does the real damage.

Steep Ground Technique: The natural instinct in such circumstances is to lean back and try to cling on with your hands. This is about the worst thing you could do. The key objective is to keep your boot soles parallel to the steeply sloping surface and your bodyweight centred above those soles. This gets the boot tread biting across the whole surface area, with your weight maximising the down-force onto the boot tread. To achieve this, the person should keep his knees flexible and a little bent forward as he faces downhill, with his weight balanced over the balls of his feet. This is hard to get boys to accept, because their instinct is to lie back towards the slope. Keeping both hands below waist level and forward is a good way to move the centre of gravity towards the right place.

It is quite vital to avoid trying to hold onto the grass or vegetation with the hands when going downhill. Doing that necessarily results in the hands being up-slope and behind, where they will drag the body weight backwards at an angle, and onto the edges of the boots. To repeat the key point, - the best grip is obtained by standing up with bent knees, the bodyweight over the balls of the feet, and the hands below waist height and forward, - but not on or near the ground. A ski-instructor teaching someone to ski on a steep slope would say exactly the same, - for much the same reasons!

Rehearse the above technique with your boys before starting down a steep slope, but remember that fear may well result in them ignoring that training when it comes to the crunch. If you really, *really* have to go down a steep wet slope, remove slippery waterproofs and favour heather, stones and scree rather than steep grass. A slip on scree might produce cuts and bruises but you'll not go far enough, or fast enough to do real damage. Is it really necessary to point out that boot sole treads should be in good condition and not worn out?

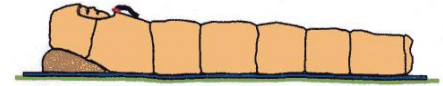
5.13 ANIMAL ATTACK RISKS

While uncommon, attacks on walkers by farm animals do occur and can be very serious. The hazard from bulls and rams is well known, and red deer stags can be dangerous in the autumn and early winter. However much less well known but a real risk, is that cows accompanied by calves can be aggressive and dangerous, because they see walkers as a threat to their young. Give cows with calves a wide berth; **don't get between a cow and its calf**, and don't walk towards them. If the cows start to come towards you in such circumstances - it's time to get on the far side of the fence!

Chapter 6: Equipment

"Let me tell you the way the World is - nothing works right."

Tom Selleck



6.1 ANORAK



A traditional anorak is a hip length outer jacket made from a non-waterproof material. It is most effective in dry or showery cold conditions since it will retain body warmth without causing condensation due to body sweat. Traditional anoraks are now rare and lined fleece jackets have become a popular alternative because they can be worn under cagoules or Gore-tex waterproofs, when it rains. Micro-fleece are particularly good at this.

6.2 BOOTS



A Walking Boot



A Climbing Boot

Hill walking boots are traditionally made of leather uppers to which a heavily cleated rubber sole is attached by glue. However in recent years many boot uppers have come to contain increasing quantities of fabric material with a Gore-Tex liner for waterproofing. The logic of the increasing use of fabric is lightness and ventilation. The logic of leather boots is greater damage resistance and longer waterproof life. Whatever the material of the boot upper, the sole should be laterally stiffened to protect the feet against stones on rough paths, but the sole should also be longitudinally rounded and flexible to allow the foot to roll forward with each step. The boot will be closed by laces through rings or hooks and the tongue will be a soft waterproof bellows attached over the full height of the boot opening so that the boot will remain dry

even when fairly deeply immersed in water. Boots designed for climbing are generally made of rigid plastic, and are obviously unsuitable for walking.

If a boot is going to be comfortable then it will be comfortable from the first time it is tried on. Reputable dealers will allow you to take a new pair of boots home, wear them indoors for some hours in order to check the fit over an extended period, and return them if all is not well. There is a myth that two pairs of socks **must** be worn with hill boots. This may work for some people but it often results in overheated feet and blisters. One pair of good quality loop-stitch socks should be enough if the boot is a good fit, provided that the advice on sock selection and blister prevention, - given elsewhere in this book, is followed. However a second thin pair of low friction socks worn closest to the foot can work well for some people. Young teenagers with growing feet should be advised not to buy boots until immediately before the active hill walking season, and buy them to fit well with two pairs of socks in the hope that they will be large enough for two seasons use, albeit with a single pair of socks in the second season. Wash boots externally after use to remove acid mud, and then dry them very slowly in a cool room. Apply Beeswax based preservatives such as Sno-Seal or G-Wax to leather boots only, but not to Gore-Tex or fabric boots which need a special spray. Wax treatments will penetrate better if warmed. Do not use traditional boot oils or dubbins on modern boots as the grease in them may cause the boot adhesives to fail, and it may not be possible to re-glue them due to the grease in the leather.

6.3 COMPASSES: Also see Chapter 4. The genuine Silva Compass is still easily the best, and the Ranger Model is probably the cheapest sound purchase. The "Expedition 4" model with a bigger baseplate is also a good choice. Beware of cheap imitations of the Silva design, which often have a much poorer performance, and sometimes have subtle design differences that set traps for the unwary. For those able to afford them Model 15 mirror sighting compasses are genuinely more accurate but more than double the price. Don't rely on electronic compasses, - especially in phones: They often tell lies! A GPS can tell direction, - but only in arrears, by assessing your previous track on the ground. That is maybe just a little late!

6.4 CROCKERY, CUTLERY, AND KNIVES: Keep the weight and bulk of personal crockery to a minimum by carrying only one good sized shallow plastic bowl which is suitable for both breakfast cereals and main courses, plus a broad based (i.e. stable) plastic mug of about 300ml capacity. These items are widely available at low cost. Buy a robust knife, fork and spoon set from a camping store, but avoid those that are stored in plastic sleeves, as the sleeves soon become contaminated. It is worth carrying one robust larger knife per party with a serrated edge and a rounded tip, - for sawing

neatly through very tough grass and heather roots to dig toilet holes. But ensure that the party is not carrying anything that could be construed by the Law as a weapon, and that any such bigger knife is robustly packaged and carried well inside a rucksack. Pointed blades are absolutely to be avoided, both because of their potential as weapons and their rucksack piercing qualities. Do not allow waist-belt sheath knives - ever!

6.5 FIRST AID KITS: The recommended contents of a First Aid Kit are given in Appendix B. Proprietary First Aid Kits bought from shops often contain items of little relevance and all fail to include some essential items. Bandages are not the key issue, - or one of the main requirements. Learn what to take from your own experience and until then rely on the items listed in the appendix, which you should carry in a soft waterproof pouch.

6.6 FUEL CONTAINERS: With some types of stove it is necessary to carry "loose" fuel in either liquid or solid form. Typical such fuels are paraffin, methylated spirits, petrol, and solid fuel tablets. However petrol and methylated spirits are no longer acceptable for use by boy expeditions, and solid fuel - as used by the military, is basically hopeless for our purposes. Paraffin might be considered an acceptable fuel, but paraffin stoves are now rare. **Never carry liquid fuel in used drinks bottles!** For those who travel abroad, be warned that, *(with one tiny exception)* it is a go-to-jail offence to carry any fuel onto an aircraft or in hold luggage. Matches are also banned anywhere within aircraft, but you can carry one small gas lighter in hand baggage *(That's the exception!)*. It is important to remember that **not-quite-empty gas cylinders must never be put in rubbish bins**: They are potential bombs! You can take them to local authority official waste sites, or put a burner on them at home and let them run until the cylinder is completely empty: You'll know because the flame will go out and there will be no hiss! This should be done outside the house, preferably in a garden.

6.7 GAITERS: Knee length artificial fibre gaiters have considerable merit if the wearer is using long trousers in wet or muddy conditions, or if the party is walking through long vegetation where there is an increased tick risk. During heavy rain they also stop water running down the legs and socks into the top of boots, - which is a major cause of wet feet. They can also reduce the consequences of the *brief* immersion of a leg in a stream while crossing, - by stopping water from sloshing over the top of the boot.

6.8 GLOVES: Many types of fingered gloves have poor insulating qualities, although thick close-knit woollen gloves and some of the modern artificial fibre designs which do not absorb water, are compact and very good. Check the range in a good mountain equipment store.

6.9 G.P.S. NAVIGATION HANDSETS

"If it can go wrong - it will!"

Sod's Law

When performing as advertised, a GPS navigation handset will produce very accurate information about the position of a walker plus a range of other useful guidance. However such sets are something of a mixed blessing, being very expensive, (£90 plus) by no means unbreakable, and often heavy consumers of batteries. Thus in the context of boy-use, and on the basis of hard experience with boys as owner/users of mobile phones, - you could expect a GPS to get broken, be lost, or quickly have its batteries flattened! Another effect of some GPS systems is that walkers can get into the habit of simply following what a pre-programmed GPS tells them to do next, and ceasing to think and observe. In bad visibility that can result in situational awareness being lost. The other problem with GPS systems is that signal availability can be erratic. If your system cannot 'see' at least three satellites it won't work, and that could happen as a result of atmospheric effects, signal blockage (*if you are surrounded by nearby high mountains*), or faults with the satellites. You can't be wholly dependent on a system that may 'go in the huff' when your life depends on it, and even the documentation included with a GPS says that! In the very worst of weather and visibility a GPS is the best navigation aid for crossing featureless ground, - if it can get a signal in such weather. But you have to ask whether the party would have risked getting into such a situation without a GPS, - for the obvious danger is that such devices will breed over-confidence and see people willingly get into ever more marginal situations where any failure of the technology will put them in great danger. It will be said that people can revert to map and compass if all else fails, - but good conventional navigation needs practiced skill and, '*feel for the ground*'. How many people will have such sharp skills when they need them if they routinely rely on a GPS? (*Also see page 42*). You can now get GPS's with all the O.S. maps loaded onto them. This has two weaknesses; firstly that you lose the "big picture" that a paper map conveys (*see Sec 3.7 P.30*); and secondly that the loss or failure of this device would result in the loss of all your maps as well as your GPS capability.

6.10 HATS: Hats may have three different functions on an expedition. In cold weather a hat must keep the head warm, in wet weather it must keep the head dry, and in sunny weather it must protect against heat and sunburn. For general warmth ski hats are very good; to keep off the rain a hat with a big brim will be effective, and in sunny weather a broad brimmed light hat will be best. Those who wear spectacles will find baseball caps with big peaks useful as a way of keeping rain off their glasses. Wool balaclavas are much too warm for general use, and unbearably itchy!

6.11 MATCHES: Ordinary matches quickly attract dampness from the atmosphere and will quickly become unusable, even in their box, if not sealed in a damp proof container. Ordinary matches might best be kept in a sealed tin together with their striking strip. The author now favours small semi-disposable gas lighters (for you can actually refuel them), which he finds to be much more reliable than matches and, of course, damp proof.

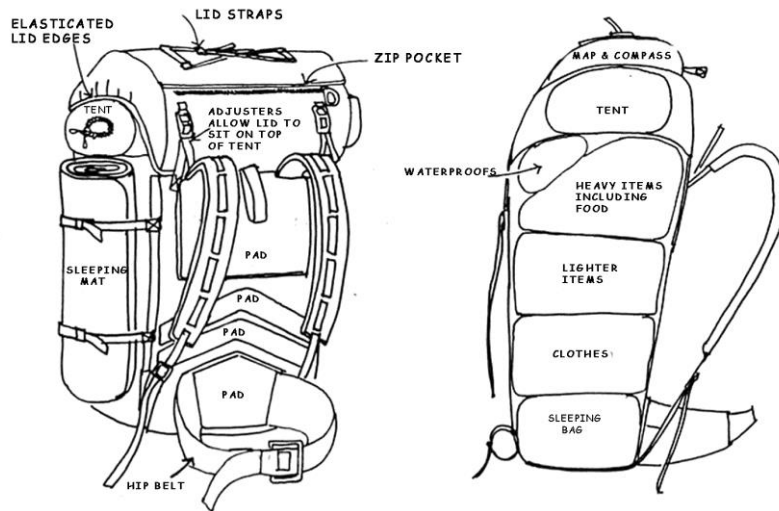
6.12 PAN CLEANERS: On any expedition there is a daily problem of removing fats and hardened cooking deposits. The most common solution these days is to carry a nylon scourer that won't take the surface off your non-stick pots, and carry it in conjunction with a small plastic bottle of washing up liquid - or you can simply use some of your shampoo: It's the same thing really!

6.13 RUCKSACKS: Like many other forms of backpacking equipment, rucksacks have undergone considerable evolution in recent years. The principle is now well established that loads are best carried high on the bearer's back, close to the line of the spine and with the weight distributed evenly between well-padded shoulder straps and a broad, padded hip belt. There are conflicting views about the merits of various rucksack designs, but the battle for popularity seems to have been won by fairly tall sacks, either with malleable internal stiffening pads or aluminium stiffening rails which also serve as a mechanism for adjusting sacks to suit users of different heights. When selecting a rucksack pay attention to the following points:-

a. *Is the rucksack strong, weatherproof and comfortable?*

Look carefully at how strongly the straps are attached. Look inside and see if the seams have waterproof overlaps, and if the fabric has been proofed. In practice no rucksack is waterproof but some are a lot more water resistant than others. Good rucksacks are adjustable to fit the user's back length, and that is a key consideration for young teenagers. The bottom of the bag must fit onto the top of the pelvis, and not trail halfway down the buttocks, as a big bag so often does with young teenagers - to their discomfort and premature exhaustion. It is also essential that the hip belt has enough adjustment to let it close tightly around the user's waist so that the waist can share the weight of the load with the shoulders. A hip belt that won't fasten tightly around a thin young teenager's waist is again a common problem that results in misery over the course of a weekend. Sometimes all it needs is a stitched back fold-over in the belt's length to provide additional adjustment. The rucksack must also have a chest strap and adjusting straps between the main arm straps and the top of the rucksack to allow the balancing of the bag and stop it from pulling you backwards. All the weight of each rucksack runs through sets of plastic adjusters. Some cheap rucksacks use brittle plastic which snaps under load. Beware!

b. *Is the rucksack large enough?* Experience has shown that a rucksack capacity of less than 60 litres is too little for substantial trips, or for expeditions in wild conditions. It is now common for many full sized rucksacks to be of 65 litres capacity and this size can be recommended. **Even bigger rucksacks can be good if you resist the temptation to take even more stuff with you!**



c. *How well can a tent be carried on this rucksack?*

Expedition members will generally have to carry at least part of a tent across the top of their rucksacks underneath the lid. See para. 5.8(e) Page 52 for the reasons. However many rucksack lids are too small and their straps too short to allow a tent to be carried in this way without imperilling the waterproofing of the load, so choose a sack which has a large lid with stretch edges and long straps. The

lid should also have adjustment straps at its front and back edges so that the lid can remain on top of the load even when it is covering the bulge of the tent.

d. *How can a sleeping mat be carried on this rucksack?*

Ideally you should buy a thin inflatable air mat. Therma-Rest is the premium product but many cheaper models are available. There are three ways to strap a mat to the exterior of a rucksack which are below, above, or on one side of the bag. Whichever position you prefer, the sack must have long straps for that purpose in the desired position. Remember that your sleeping mat should be rolled up inside a strong plastic bag to keep it dry. The same kind of bag as you use as a rucksack liner is about right. **Very big** strong rubber bands around that bag are a good idea. You can order rubber bands

like that on the internet. If you use an 80 litre rucksack and your mat can roll folded in half lengthways, you might get it inside the load within the bottom compartment along with the sleeping bag (*all inside a waterproof liner*).

e. Should the rucksack have outside pockets

External pockets can be very handy for small items, waterproof clothing, water bottles and lunch. However they often result in sacks being packed very badly, with too much in the outside pockets and not enough in the interior to give the bag a proper shape and balance. Multi-pocket bags also have a large number of seams, are hard to waterproof against severe conditions and do not adapt easily to partly loaded use as day sacks. Two big outside pockets, a lid pocket and an internal pocket for valuable documents is a good combination.

6.14 SHIRTS: Shirts can have many functions. They might have to keep the wearer warm in cold weather; disperse sweat; protect the back against abrasion; protect the body against the sun in hot weather, or several of these things at the same time. The latest designs of perforated/wicking T-shirts made from artificial fibre are very good at all of these functions, - but expensive. Cotton shirts are not ideal because they get soggy with sweat when the wearer is working hard, and are slow to dry, - but the reality is that almost all boys will need to use cotton shirts, because that's what they have! Avoid embroidered badges that can cause nipple rash, and thick shoulder seams which can be very uncomfortable underneath rucksack straps.

6.15 SLEEPING BAG: Sleeping bags come in a wide variety of types designed for different purposes. An expedition bag has to be **very** compact so that it will fit easily into the bottom of a rucksack and not take up more than 20-25% of the rucksack capacity, - so the bulky sleeping bags used on family holidays and in caravans will not do the job. An expedition bag also has to be light in weight.

When considering the purchase of a sleeping bag it is important first to decide which seasons of the year it will be in use. Winter bags and some "3 season" bags will be too warm for expedition use in normal late Spring to early Autumn conditions, and of course they are bulkier and more expensive. However Expedition sleeping bags should be reasonably warm as well as being very compact. Certain constructional features of sleeping bags need to be noted because they affect their performance. These are as follows:-

Fillings: Real warmth with very small size is only available with down fillings. Unfortunately down bags are very expensive and some people are allergic to feathers and down. One alternative for a warm bag is a filling of polyester hollofil which, while cheaper, and safer for people who have allergies, is both heavier and bulkier. These sleeping bags have to be chosen with care and a compression sack will be needed to make the packed size small enough to fit into a rucksack. In recent times a wide range of low-cost, very compact sleeping bags have come on the market that employ sheet insulation such as *Du-Pont Thermolite*. If selected with care they have much to commend them. However you should treat the temperature-suitability claims on these bags with great scepticism, and it would be prudent to add something like 7 or 8°C to the minimum-use temperature claimed on any low-cost bag. Holofill and Thermolite perform much better than down if a sleeping bag should get wet.

Through Stitched Quilting: Through stitched quilting divides up a sleeping bag by panel stitching which goes right through the bag from the interior to the exterior. This is undesirable because it causes cold spots at the stitching and reduces the warmth of the bag. Test for through stitching by grasping a seam between the finger tips both inside and outside the bag. If there are no gaps between the fingertips then it is a through-stitched sleeping bag.

Zips: Sleeping bag zips are prone to breakage. However they can be opened on warm nights to prevent overheating, and that can be an important option.

Mummy Design: Good sleeping bags have an extension of the sides and bottom of the bag beyond head length, and a draw cord which enables this extension to be tightened around the face of the occupant so that it keeps the head, shoulders and neck warm. This is a very worthwhile feature which has the added advantage of increasing protection against midgies.

6.16 SLEEPING MATS

Easily the best solution is a thin air mattress. A fairly wide range of modest cost models is now on the market, so shop around. It is important that the mat rolls tightly and small. Ideally it will fold in half along its length and roll up into a bag supplied with it. Alternatively roll it over its full width, put it in a waterproof bag and carry it on top of the rucksack.

Waiting for the train home: Rannoch Station



6.17 SOCKS *(also see "Blisters", section 8.1)*

The use of unsuitable socks is widespread among inexperienced hill walkers, yet this is the item most likely to contribute to the success or failure of the trip. Feet are put under great pressure by hill walking, - so crippling blisters and sole bruises are common. The selection of socks is therefore quite vital. The sock exterior must be strong and wear resistant; the interior must be soft, well-padded and good at transmitting sweat without becoming soggy; seams must be smooth and as few as possible, and the whole sock should be a close elastic fit that will grip the foot firmly. Nylon football socks (*too abrasive*), floppy loose socks (*blister prone*) and cotton socks (*get soggy with sweat*) are all bad and should be avoided. Some recent (*expensive*) socks claim high technology, and boast of advantages in wicking sweat away from the feet. In practice they have not, in this writer's experience, demonstrated any obvious improvement on soundly designed socks of conventional composition (- *and have sometimes seemed worse*). Much depends on individual reactions.

6.18 STOVES: All camping stove designs are a compromise between heating power, safety, mess, weight, and cost. Different types have different characteristics. Some are quite dangerous for use by naïve boys: So choose carefully!

Gas stoves are generally light, simple to use and cheap to buy; but are expensive to run, can have feeble heating power, are usually draught prone, and sometimes very unstable. Replacement cylinders can also be hard/impossible to get in remote areas. Gas stove designs that have a wide low base with folding legs, and a rubber hose gas feed are very much better for both heating power and stability and they fold up sufficiently compactly to fit inside many types of mess tin sets. Propane/butane mix has now virtually taken over from pure butane as the gas fuel for expedition stoves.

Traditional paraffin pressure stoves of the Primus type are rarely used any more. Petrol stoves, while powerful, are dangerously explosive and banned. (*See Section 6.6 on fuel containers.*) Solid fuel stoves are very simple and cheap, but there is no means of controlling their burning speed, their cooking ability is crude, and the stench of their fuel blocks will contaminate everything in your rucksack.

The Trangia company makes methylated spirits stoves that are integrated into well designed sets of cooking pots and clever wind baffles. However burner control is crude with a likelihood of burned fingers when used by the young, [and the Boys' Brigade bans their use by boys on expeditions](#) because the burner involves the combustion of an open pond of volatile liquid fuel in a small pot. (*The fire mentioned in appendix E resulted from boys knocking over a Trangia stove.*) There is a particularly

severe risk if such a stove runs out of fuel part way through cooking a meal, and impatient boys then try to refill the burner with Methylated Spirits while it is still hot. That is an accident waiting to happen, and has already resulted in a very severe accident to a youth party. However there is a gas conversion for Trangia stoves that is effective and safe, - but you do have to buy the extra gas burner. *Recently some very effective small burners have become available to screw onto the top of gas cylinders. If used together with a fold-out three legged gas cylinder stabiliser made by Primus they become a compact and low cost stove.*

Recently on the market is the Jet Boil stove with an insulated pot and integrated heat exchanger in the pot base. These are very fast and economical in boiling water, but cost about £90, *are inclined to cremate food rather than cook it, and are too easily knocked over because they are tall and narrow. Alternatively, in conjunction with the small low cost burner mentioned on the previous page you can also now buy separate heat exchanger pots, which are exceptionally good, and cut your cooking time and gas consumption in half. See 6.24 for more information.*

Bluet "Camping Gas" stoves of French origin (*blue cylinders*), are usually very powerful, but bad in windy conditions because they are designed for the much calmer conditions found in France. Also they tend to use the round cylinder as the base of the stove, resulting in a very tall, narrow, wobbly setup once you have put a burner head and pot on top of the cylinder. But don't discount these stoves because you may well be forced to use them on continental trips. (*cylinder availability*). But to make them safer go to a good mountain shop and buy a folding 3-legged plastic tripod made by Primus which will clamp around the bases of Camping Gas cylinders as well as Primus cylinders - and make the whole thing a lot more stable.

6.18 SURVIVAL BAG

The so-called Survival Bag, better called a Casualty Bag, is just a man sized heavy duty orange plastic bag. Even in summer there should be one in each party that is not carrying tents, - so that you have someplace to get a casualty out of the weather. In dire emergency a survival bag will keep off the wind and rain, but it will not dry out clothes that are already wet, and it will not prevent hypothermia! These bags have more regular value as waterproof containers for rucksacks that have to be left outside a tent. Backpacking expeditions carrying tents, karrimats and sleeping bags, have no real need for a survival bag. Put a casualty into his sleeping bag in the tent or, if you can't put the tent up, wrap him in the tent flysheet.

6.20 TENTS: Tent design has been, and still is, undergoing a considerable revolution, and you will find that Expedition tents come in all shapes and sizes, each with its own advantages and defects.

However all Expedition tents, whatever their design and materials, invariably must meet the following criteria:-

- They must be light enough to carry - no more than 2.0 kg. per occupant.
- They must have excellent resistance to strong winds - a combination of strength, smooth wind profile, and very good pegging arrangements.
- They must be very resistant to the penetration of wind driven rain, and in every case will have a separate interior and exterior skin. (*The exterior skin is, for some obscure reason, known as a "flysheets".*)
- They must have a waterproof groundsheet wholly stitched to the interior tent as an integral component.
- They must have effective ventilation, protected by very fine mesh midgie screens, and it should be noted that some such screens are not midgie proof, because the mesh gauge is too large.

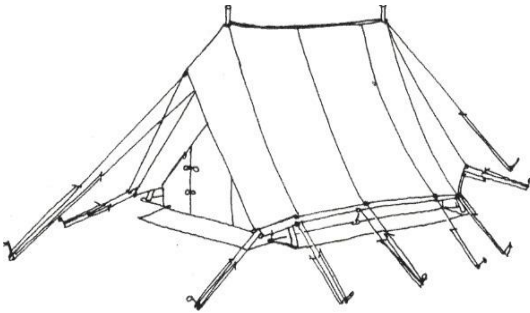
As well as the above list of essential qualities it is highly desirable that an expedition tent for use by boys should be 'idiot proof', very damage resistant and should have a porch at the front door and a protected storage area at the rear end of the tent. Tents with front and back doors are inherently safer in situations in which cooking has to be done in the tent porch, as the back door allows free movement without imperilling the stove and provides a means of rapid exit away from any fire.

Within the criteria given above it will be found that there is no perfect solution. Traditional cotton ridge tents are strong, damage resistant, easily put up by boys, and resistant to condensation, but they are also cramped, lack headroom and tend to be very heavy.

The modern trend has been towards waterproofed nylon tents of the igloo or tunnel patterns that are supported by up to five very long thin alloy poles which can bend almost into a semicircle to form hooped supports. Fibreglass 'bendy' poles are not really an option, for they are much too heavy and don't last long in regular use. The best alloy hoop-pole tents offer exceptional performance in strong winds, are wholly waterproof, spacious, light, and have excellent protected doorways and

storage areas. However they are also very prone to condensation, have a limited life, are expensive, and it needs training and care to erect them properly without damage. They are also anything but 'idiot proof.'

In between these extremes lies a vast range of models which possess some good and some bad points. To be fair there are many relatively cheap tents which will perform perfectly adequately in average expedition circumstances, and which can be bought and used with confidence provided that the owner has the sense not to employ a cheap tent in high risk weather conditions in the early Spring or late Autumn. Tent technology is evolving rapidly- look out for further changes, - far from all of which are improvements!



An expedition tent of traditional design



A modern geodesic nylon tent of 5 pole design

6.21 TORCHES

The only good solution is the head torch, which allows the wearer to work with both hands, and of course always points where the wearer is looking! Lightweight LED head torches hardly consume any power and you can now buy them very cheaply - even from supermarkets. There is no cause to spend more than is needed to acquire a light, compact, damage resistant design, but the use of alkaline batteries to provide staying power is very desirable.

6.22 TREKKING POLES (Walking Sticks)

In recent years many walkers have started to use length-adjustable poles as an additional support for hill walking. These bear a great similarity to ski-poles except that their length can be changed as the user prefers for uphill and downhill walking. Experience so far suggests that they have both advantages and disadvantages. As far as advantages are concerned they do significantly improve the speed and endurance of a backpacker going uphill over relatively regular open ground, and *if properly and skilfully used* they can take the pressure off knees during long descents. They are also an excellent aid to improved safety when crossing rivers or spring snow patches. On the other hand their disadvantages are, firstly that they tend to make the walker much more careless about his foot placement and balance. This results in more stumbles and slips, - which are then often rescued by leaning on the poles. Then the walker praises the pole for saving him from a slip that he probably wouldn't have made if he hadn't been using poles! Secondly if used to resist momentum when coming downhill they tend to rotate the user's upper bodyweight back over his heels, thereby increasing the frequency of 'sit-down' slips on steep mud, loose grit, or slippery rock. There is a way of avoiding that by using the poles vertically and close to the feet to reduce knee impact, rather than by placing the poles in front and pushing back. Thirdly, on complex stony ground or scree, the need to place both poles and feet distracts the walker from the priority of putting his feet in the right place, for he now has to make two placement decisions for each step instead of one. Fourthly in heather or other deep vegetation, the poles get caught up continually and are a profound nuisance. Lastly they are extra weight and cost. So there you have the pros and cons.



Stob Dubh of Buachaille Etive Beag, Glen Coe, May 2019

This writer sometime uses trekking poles as an aid on long ascents, and also in the manner recommended above as an aid to reducing knee pressure on long descents. They are also excellent as river crossing supports, and as a way to test boggy areas before standing in them. But in the U.K. their use is hampered by the amount of deep vegetation on the hills. Used selectively they can be good: Used badly they can actually increase the risk of slips and falls.

Reaching Sourlies Bothy on Loch Nevis in the evening sun. October 2016



6.23 TROUSERS

It is generally accepted that there is a real problem with many designs of full length trousers in UK hill-walking conditions since they get covered in mud below the knee and can drag against the legs when wet, thereby impeding movement.

Three-quarter length polyester bottoms, often used for sports training, can be a good alternative if worn in conjunction with long socks. Those designs that have draw cords just below the knees are very effective for expedition work, especially if a pair of 'sawn-off' long johns is carried to wear under three-quarter bottoms in cold weather. This combination is flexible and effective for expedition work, keeps the trouser legs out of mud, and dries very quickly. Another cheap alternative is the use of lined polyester full-length

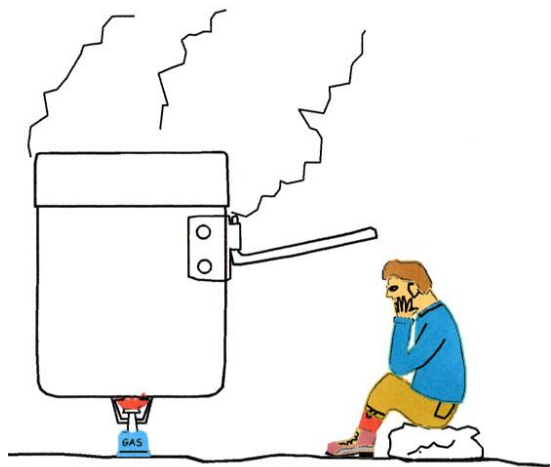
shell suit bottoms. (N.B. not cotton track suit bottoms!) These have a generous fit, do not get heavy when wet, are quite windproof, and dry very quickly. Purpose designed artificial-fibre walking trousers are also excellent and very quick driers, but they get messy in muddy condition unless you also wear gaiters. Full length trousers and gaiters are better at tick-bite prevention, which is an increasingly important consideration.

Jeans are very bad for expedition work. The reason is that they are made of Denim, which is a heavy cotton cloth. The prime characteristic of cotton is that it absorbs water - hence its use for towels! Denim jeans therefore get very heavy when wet, and become stiff because the woven cloth has swollen. They also lose their insulating qualities and can become very cold.

Now that it is possible to buy suitable polyester shell bottoms for just a few pounds from a discount sports store, there is no longer any real reason to accept the use of jeans, even on a first expedition.

6.24 UTENSILS

There is a very wide range of cooking utensil sets available for purchase in outdoor equipment shops, but you will not need



to buy any if you have a Trangia gas conversion stove, for these stoves have pots that are integral to the design. Otherwise you will need to carry a set of pots and in choosing them you should first consider the number of meals that will need to be prepared at the same time. Cooking for one person only needs small pots, but cooking for three needs larger pots. Generally a nest of two pots with good lids and a strong clamp handle will be satisfactory. It is prudent to carry a spare clamp handle.

A recent exceptionally good innovation is pots, usually sold singly, which have heat exchanger fins on their bases. These pots - and to some extent the Jet-Boil stove, have revolutionised the speed of cooking and halved gas consumption. Fast cooking for less gas is a big win in expedition terms, however these pots are not cheap, perhaps £40 each and they need to be used in conjunction with carefully chosen small burners on which the heat exchanger will sit comfortably. However a

heat exchanger pot, appropriate burner, and fold out gas cylinder stabiliser will be quite a lot cheaper and much more compact than a gas conversion Trangia. You'll find that with a bit of menu cunning, you will get by with just one pot!

6.25 WATERPROOF JACKETS AND TROUSERS. (Also see 5.10)

Expedition members must all have a genuinely waterproof jacket which should be a generous fit, and have a good hood. Waterproof overtrousers are essential for trips at high level, - or otherwise when cold wet weather is a possibility, but such garments are notorious for dragging badly and must be a good and comfortable fit, with long side zips for donning them over the top of boots. In mild wet conditions it can be better to wear a waterproof jacket and fast drying nylon shorts, (*e.g. such as swimmers wear*) - and just let your shorts and legs get wet, - because of the much freer movement that this allows. The photo on page 108 shows this.

Very modestly priced 'waterproofs' may not in fact be waterproof at all. Look for a shiny internal surface and a label describing the waterproofing qualities. Cheap waterproofs will also not possess any breathability and will therefore be prone to serious internal condensation from body sweat, - hence the reason why they are only suitable for use in wet weather. However a perfectly serviceable and compact set can be obtained for as little as £60 if you accept that they are

only suitable for wet conditions.

Higher priced waterproofs will claim a range of breathability levels to counter body condensation. The best known brand name for breathable garments is Gore-Tex but up until now, many designs have been too bulky and heavy for backpacking work. This has resulted in thin Gore Tex jackets, but these are expensive and practical experience has been unconvincing in terms of value for money. There is much to be said for buying cheap non-breathable waterproofs and accepting the condensation.



Beginners: A very wet weekend in Glen Callater: June 2019

Chapter 7: Emergency Procedures

"Two things are absolutely certain about disasters. One is that they will occur. The other is that nobody knows when."

Flight International



When an accident or an illness occurs in the hills or at a remote location, then all action taken should relate to the Standard Emergency Procedure given below.

ACTION 1: SECURE CASUALTIES FROM FURTHER DANGER

(N.B. First read *Action 5* concerning the movement of bad casualties.)

Following an accident, a casualty might be at risk of immediate secondary injury from rockfall, avalanche, drowning, fire, road traffic etc. While taking appropriate precautions for your own safety, act vigorously to remove the threat from the casualty, or if absolutely necessary, the casualty from the threat. Remember that you owe a duty to the party not to become an additional casualty yourself while attempting a rescue, because you will be imperilling their survival as well as your own if you get injured.

ACTION 2: ACT URGENTLY TO ENSURE CASUALTY SURVIVAL Immediately after an accident the survival of a serious casualty is at risk until you have secured his breathing, blood supply and heart function. The first aider only has about three minutes to get these elements right before the patient will die or suffer permanent brain damage. In these three minutes concentrate **only** on making sure that **all** the victims are breathing well, have a satisfactory pulse, and are not suffering massive bleeding from arteries or veins. (*This last point refers only to injuries that are producing **very** large quantities of blood.*) When there are a number of casualties it is important to go quickly round them all, especially those who are unconscious, to make sure that they are all in a position in which they can breathe, and can all receive swift action to deal with massive bleeding or heart function problems. The casualty who screams loudest is not always the worst injured, for he at least is breathing and conscious. The silent, unconscious casualty may be closest to death.

ACTION 3: ASSESS THE FULL INJURIES OF THE CASUALTIES Once it is certain that all of the casualties are going to remain alive at least in the short term, then a comprehensive assessment should be made of all the injuries sustained, including checks for spinal injuries, measurement of pulse and respiration rates, and state of consciousness tests.

ACTION 4: CARRY OUT FIRST AID TO THE EXTENT POSSIBLE In order of priority, carry out First Aid treatment to the extent that the available equipment may permit, concentrating first on the worst injuries on each casualty. Stop all bleeding, immobilise and support fractures and place the casualty in the best possible position for his injuries. (See 5 below).

ACTION 5: DECIDE IF CASUALTIES SHOULD BE MOVED *See Action 1: In cases of spinal or internal injuries, the movement of a patient at all, might easily be fatal or might otherwise cause paralysis.* It would be easy to say that casualties must never be moved and to put this instruction as Action 1 in the sequence. That would not be helpful for there are circumstances in which the first aider might have to take a calculated risk to move such a casualty. There would be no merit at all in leaving a spinal casualty where he lay if failure to move him would result in his immediate death from some imminent and obvious threat. (e.g. fire, drowning or road traffic). An urgent need to restore breathing or cope with desperate bleeding might also override the fundamental principle of not moving a very seriously injured casualty.

So it cannot be said that such a patient must never be moved, but it must be understood that to do so is a critically dangerous measure. Spinal injuries - including the neck, must be checked for immediately if there is no other immediate threat to the survival of the patient, and if they are present the patient must only be moved if he could not survive without being moved. Moving such a casualty pre-supposes that the aid party knows how to move a spinal casualty. That requires much knowledge, skill and discipline and should be learned properly on a First Aid course.

ACTION 6: INSULATE CASUALTIES AGAINST COLD AND WET Once the condition of the casualty has been stabilised there remains the major problem of keeping him, or them, warm and dry until the rescue team arrives, - which is why the question of moving a casualty (into better shelter) becomes a key issue at this stage. The wait for rescue may be many hours and perhaps even overnight. A serious casualty will succumb very quickly to cold and exposure because his body resistance will have been greatly weakened by Shock. Maximum effort must be made to insulate the casualty so that he will survive the wait, and if that cannot be done where he lies then he must be moved to a place of better shelter (again see Action 5). If there is a tent available, erect it around the casualty, or if necessary put him in it.

Give the uninjured members of your party careful attention. They may also now be suffering from the cold and they will also become exposure victims if they have a long unprotected wait on a cold hillside. Decide how many people must remain with the casualty and send the remainder down to a place of safety under supervision, after relieving them of any spare insulation that they don't need.

ACTION 7: SEND FOR HELP When asked what to do after an accident, most people see *Sending for Help* as their first priority, yet here it is only listed as the seventh thing to do. A great rush to fetch help may be all very well in cities, but in the depth of mountain areas it will be hours, - and possibly much more, before the first professional assistance can arrive at the casualty. Time spent assessing and treating the casualty before you send for help is therefore going to make no significant addition to the total amount of elapsed time before help actually arrives, - but your preparation and organisation at the outset may well be the means by which the casualty is enabled to stay alive until help does come. Time taken preparing comprehensive information about the casualty for the messengers will also undoubtedly help the emergency services to send you the right type of assistance.

The above advice applies even if you've got a mobile phone and can get a signal. Immediately after an accident people are excitable and often panicky, and some absurd things have already been done by parties bellowing for help down mobile phones before they knew what they were talking about. Decisions taken quickly are likely to be wrong and may be dangerous. Remember that rescue parties, and especially helicopter crews have to put themselves in harm's way to respond to your emergency call. Never forget that you have a safety responsibility to them as well !



So members of a party must concentrate totally on what they themselves can do for the casualty and only send for help when the situation has been managed to the best of their ability, and they themselves have calmed down and are thinking logically. In a situation like this, firm calm command and leadership by one person will be quite vital. Don't let anyone make phone calls or take decisions if he hasn't got himself calmed down and very well under control!

Breaking Camp in Glen Pattack, - West of Dalwhinnie

HOW TO SEND FOR HELP

If you have a mobile phone, -and a signal, then of course you should use it, but get your information organised before you make the call, on exactly the same basis as is described on pages 81 and 82 (*the 5 'W's*). Know the number of your mobile, - because that's about the first thing you will be asked. Designate one person as the single contact on the phone. You don't want confusion caused by different people saying different things. Nominate a sensible, calm, person with a clear voice to be your caller, - and call the standard emergency number. If the signal is weak, or not really there at all, it is worth trying to send a text to a friend, because texts are transmitted at a higher signal power, and might just get through. Also leave your phone on standby after an emergency call or text, because your position can be triangulated by the service provider, by them interrogating your phone and getting an automated response. This is called 'pinging'.



Just off the West Highland train, Corrour Station, Rannoch Moor

Designating and protecting an Emergency Phone

Those familiar with teenager behaviour will know that they virtually all consume their phone battery life at a high rate. So unless they are carrying backup battery packs the chances are that any personal mobile phone will have a flat battery just when it is needed for an emergency call. It would be a good idea to get each group to carry a fully charged backup battery pack in a sealed bag which they may not open except if it is needed in an emergency. Demand to get the battery pack back with the wrapping unopened if it is not needed for an emergency, and come down on them hard if they don't do that.

Fetching Help Conventionally

However in 2020 it is still probable that you won't have a phone signal in the depth of the mountains, and thus you must physically send people to fetch help. When sending for help there are three key decisions to be made which are:-

- Who is going to be sent to fetch help?
- Where will they go to obtain help?
- What message will they carry and how will they carry it?

Who goes for help?

If there are many fit survivors then three should be sent for help. If there are three or four fit survivors, then two should go for help and at least one, - normally the leader, should stay with the casualty. If there are two fit survivors then one goes for help and one stays with the casualty. If there is only one fit survivor then generally he should stay with the casualty and broadcast distress signals to attract attention. If this fails over a lengthy period and casualties must be left on their own, then they must be conspicuously marked. Any who are unconscious or confused should be secured against the possibility that they may wander off while you are absent. Pin a note to an unconscious casualty telling him that you have gone for help so that he may see it if he comes round in your absence.

Where is help to be obtained?

The messengers must proceed to the nearest telephone, and often the best way to do this will be to get to a public road and stop a vehicle. There will often be a mobile phone in the car. Remember that many motorists will fail to understand your signals, or be alarmed, and therefore refuse to stop, **SO MAKE SURE YOU DON'T GET RUN OVER.** Remote mountain lodges, especially in Scotland, are normally empty and boarded up so don't head for such buildings in the hope that someone might be in them. Once at a telephone dial 999 and ask for the **POLICE**. Only the Police have the authority to order a Mountain Rescue and ask for helicopter assistance.

What Message should be carried?

Accident information should consist of a written message from the party leader if at all possible. A map is a good thing for marking the accident spot with a cross, and writing the grid reference and a full accident report on the back. Remember to use a waterproof writing instrument such as a pencil, or a biro. The accident report should give the following information:

- Who?** : The names, addresses, ages, telephone numbers and state of health of all the members of the party. The parents of the uninjured will want to know that their sons are safe.
- What?** : Describe the accident. Give details of the casualties, and a full assessment of their injuries and condition.
- Where?** : If possible give the Police a map marked with the position of the casualty as both a reference and a cross on the map. Describe the site and indicate if there is firm, flat, ground nearby where a helicopter might land.
- When?** : Give the time and the date of the accident, and indicate the time at which the party remaining with the casualty will first anticipate the arrival of assistance (and therefore be watching for its arrival.)
- Wanted?** : Say what assistance is wanted for the casualty and what resources are already on the site to assist with the evacuation.

THE INTERNATIONAL DISTRESS SIGNAL

Help is sought by broadcasting six signals at intervals of one minute, by torch, whistle or shout. The reply to any distress signal that you may hear should be three signals in the following minute. Almost any whistle blowing or torch flashes in a mountain area are liable to be interpreted as distress signals, which is a reason to use torches and whistles with great discretion.

HELICOPTER RESCUES

Helicopters are now the principal means of search and casualty evacuation in the British mountains, and any party which has sent for help or believes itself to have been reported overdue, should be prepared for the arrival of a helicopter. The following guidelines which were prepared with the assistance of "B" Flight of 22 Squadron Search and Rescue Unit, then stationed at RAF Leuchars, will help you to assist the aircrew.

Make yourself visible: By day, lay out bright materials such as survival bags and waterproofs to form one very large patch of colour. Movement is also more easily spotted from the air so wave bright clothing if you see a helicopter. By night, flash torches at the helicopter and when it turns towards you switch your torches to a steady beam. As the helicopter gets closer, - but not really close - point your torches at each other *and never at the helicopter* as direct torch glare will

destroy the pilot's night vision. If the pilot is using light intensifying Night Vision Goggles your torch will dazzle him. Keep the party together so that the pilot can be sure you are all out of the way.

The Landing Site: The helicopter will probably fly past your position and drop a smoky flare to help the pilot to judge the wind direction. It will then probably approach from downwind of you (*i.e. flying into the wind*) and will land if possible, or hover just above the ground. Watch for signals from the winchman (*i.e. the crewman at the side door*) as you may be wrongly positioned and he may want the party to move.

Once the helicopter has seen you, pack away all loose items such as plastic bags, waterproof clothing and hats securely into heavy rucksacks as otherwise these will blow about in the rotor blast and endanger the aircraft.

Do not approach the helicopter until the pilot or winchman gives you a "Thumbs Up" signal. Never approach a helicopter from behind.

Winching: If the helicopter decides to recover you by winch then you should STAND STILL AND DO NOTHING unless signalled to do otherwise by the winchman. He will place the winch strop around you and will guide you into the aircraft. Listen to what you are told and follow all instructions exactly. When in the cabin sit in the seat as directed and keep still.

Unsuitable Locations: The weather, or your position in difficult terrain may make it impossible for the helicopter to recover you from that spot. Watch the helicopter crew as they may wish to direct you to a better spot for landing or winching. Look for hand signals and obey them. Don't panic if the helicopter flies away. It may have found conditions to be too dangerous in your local area and if so will probably have gone to collect a ground rescue team which it will set down as close to you as possible.

Helicopters bite! Helicopters save lives but they can also be very dangerous. The blades of the main and tail rotors will kill anyone they touch. Never approach a helicopter until cleared to do so by the crew. Getting yourself killed by your rescuers would be just a little sloppy! The normal safe angle of approach to a helicopter is diagonally from the front on the same side as the open door and only when specifically signalled to do so.



Approaching Carnmore in Fisherfield, South East of Poolewe, en-route to A Mhaighdean

Chapter 8: Expedition First Aid

"The knack lies in learning how to throw yourself at the ground and miss.....Most people fail to miss the ground and if they are really trying properly the likelihood is that they will fail to miss it fairly hard."

Life, the Universe, and Everything.



The purpose of the information contained in this chapter is only to convey some rudimentary First Aid information to cover situations in which an overlap occurs between Expedition training and First Aid training for the student. Additionally there is coverage below of those specialised elements of First Aid which are particular to mountain situations. This material is no substitute for proper First Aid training, and must not be used as such.

8.1 COMMON CONDITIONS

Asthma: Asthma is a breathing difficulty, caused by a muscle spasm, which has become increasingly common in the last few decades. It affects a fair proportion of children, - so you will come across this. The cause can be irritants in the atmosphere or it can be caused by stress. Asthmatics generally carry an inhaler, and have an established pattern of self-treatment. From your viewpoint as an expedition leader you need to be sure, before leaving home, that the person in question does not suffer serious attacks and that his lung capacity is not impaired, - for you are going to ask him to carry a heavy rucksack uphill! He must have an inhaler with him and a spare. If you encounter a bad asthma attack, try to get the casualty to relax and concentrate on getting him to breathe OUT more strongly. Asthma is often not serious. However bad attacks can threaten life, so treat an asthma attack as a major casualty *if his inhaler does not restore him to normal in a short time*. Be ready to support breathing and send for urgent help. Obviously such a casualty cannot be asked to walk!

Bites: (also see "Stings" and 8.3.3 "Snakebite".) Most bites are inflicted by blood feeding insects such as the Midge (or Midgie), Cleg (or Horse Fly) and Tick. Bites from large animals are much less common but need more care. Midgie bites can inflict great misery because the female midgie injects an anticoagulant during blood sucking which causes great irritation and itching. Many people only get a small red spot from a midgie bite, but people with anti-histamine reactions suffer large itchy spots which may well be scratched until they bleed, with a consequent risk of infection. Anti-histamine pills can combat the swelling and itching. A Cleg is larger and longer than a house fly and often mottled brown in colour. It does not inject

irritants, and the after effects of its bite are normally negligible. However the actual bite is painful and it can drill right through a T-shirt. Occasionally a cleg bite may become infected as with any puncture of the skin, so it should be cleaned with antiseptic. Tick bites are completely painless and the first you may know of them is when you find the tick on your skin. However this tenacious little pear-shaped parasite can leave his head and jaws buried in the skin when he is pulled off, so make sure that all of the insect is removed and clean the wound very carefully. While it isn't common, some ticks carry Lyme's disease, which can be very nasty and must be treated. So anyone with a rash, and/or flu-like symptoms in the days or weeks after a tick bite should see a Doctor, and tell him about it. (Read 8.3.4 carefully). Bites from large animals should be referred to a Doctor especially if the boy's Tetanus vaccination is out of date.

Blisters: These are the most common source of real pain on hill walks and the cause is often poorly understood. A blister most often occurs when boot and stocking move together causing friction between the stocking and the foot. Heel blisters are most common, but the ball of the foot, the tops of the toes, the gaps in between the toes, and the underside of the heel are also common sources of trouble. The first symptom is a hot or nippy spot on the foot and long term damage follows very rapidly, often in less than 15 minutes. A blister can occur within 30 minutes of the start of a walk. Prevention is more important than cure! (*See 1.3 "Fitness Monitoring"*)

To avoid blisters use socks of the correct design and fit (*see 6.17 "Socks"*). If a hot spot occurs stop immediately and treat it before it becomes a blister. The application of skin lubricants to hot spots has shown some promise, but don't overdo it. Alternatively apply a **thin** adhesive fabric plaster over a large area of the foot around the hot spot. The principle of plastering a hot spot is to attach a tough surface very firmly to the foot so that it will move with the foot and act as a replacement skin. **Do not** use loose or thick padded plasters for they will increase the tightness of the boot and also move with the sock to rub against the blister and cause even more damage. Broad fabric plaster rolls (*no dressing*) can be very effective for hot spots that are not yet blisters, but the Elastoplast version of this is now too stretchy and not adhesive enough. The specialised blister-protection products of *Compeed* and *Spenco Second Skin* (*not cheap*) have their aficionados and it is really a case of whatever-works-for-you. To plaster a developed blister, use the same technique as for a hot spot, except that the blister itself should be covered by the minimum area of thin dressing, secured by adhesive plaster tightly applied over a large area to minimise surface movement at the blister site. Experience shows that it is possible for a walker to continue, even with a bad blister, if you have identified and neutralised the cause of the blister as well as

treating the blister itself. But if the cause isn't countered, things will only get worse! Trying different socks is always worth a go.

Burns and Scalds: Minor burns and scalds can be effectively treated by being chilled in cold water and kept clean with a non-stick dressing (see Major Burns Sec. 8.2)

Cramp: This painful muscle spasm most often occurs in cold tired leg muscles after a long effort. The remedy is rest, warmth and dry clothes. Stretching the affected muscle will help relieve the immediate pain, but cramp will often recur more and more frequently, thereby hampering progress and exhausting the casualty. Try to end the day's effort quickly. If cramp occurs in hot weather suspect dehydration. (see Section 8.3)

Cuts: These should be cleaned with antiseptic and covered to protect them against dirt. Fingertip and knuckle plasters are now included in some packs of Elastoplast. Knee and elbow dressings are best held in place by a tubigrip. Don't use cotton wool or lint directly onto a wound as it will harden into the healing wound and cause bad damage on its removal. Use Melolin film for large cuts or grazes and clean them carefully to avoid infection. Sterile wound closures should be carried to pull together the sides of large cuts.

This was real: Mike's foot went through a snow bridge and his shin tore down the face of a granite boulder. It was just a little nippy!

Chapped Skin and Cracked Lips: These are common mountain complaints in hot sun and dry cold weather. Apply lanolin cream to dry skin and sun screened lip salve to cracked lips.

Diabetes: Medical advice is that diabetes presents expedition leaders with the most difficult and potentially dangerous of common medical conditions. This illness results from an unstable balance between insulin and sugar in the body. A sufferer has to manage this by carefully balancing his sugar consumption with the ingestion of insulin, by one of a number of methods. He can do this fairly easily in normal life, but the hard effort of an expedition makes it more likely that the balance will go wrong. Thus you should not take a diabetic on an expedition without, in advance, practicing the procedures that he has to go through, and knowing where and how he stores his medical supplies. There are two common problems that arise with diabetics. The first called "hypoglycaemia" occurs when his sugar level gets too low. He will then go pale, sweat



and become dizzy. The first treatment/test for any sick diabetic is to get the casualty to swallow a small amount of sugar or very sugary food, - such as chocolate. If he is hypoglycaemic then that will usually produce a rapid improvement in his condition, and he will then be well enough to manage the rest of the problem himself. But if he deteriorates further, then he may well be hyperglycaemic, (i.e. too much sugar/too little insulin) - and needs insulin rather than sugar. *(Whatever you do, don't give him any more sugar or food!)* This is a quite common result of young diabetics not taking their insulin because they don't want to look abnormal among their friends. Sometimes they also take too much extra carbo-hydrate because they are about to do exercise, -which has the same effect. Hopefully you can get him to take his insulin before he becomes too ill to do so, but if not you will face a major emergency. Expert advice is that you should not tolerate even minor illness in any diabetic in the field, and act early to get help. It is very unwise to take diabetics into remote country.

Eyes: When there is an object in an eye, do not allow the casualty to rub the eye. Try flushing the object out with lots of clean water. If the object can be seen and is not buried in the eye surface, then you might try to lift it off very gently with the corner of a **wet** clean handkerchief. If an object is buried in the eye surface, cover the eye, ensure that the casualty does not touch it and get to a hospital. Medical advice is that eye patches and bandages over eyes can do more harm than good if badly applied. Wearing a pair of sunglasses to protect an injured eye has been recommended.

Fainting: A few people are prone to fainting after hard effort or as a result of illness. If someone faints try to catch him before he hits the ground, make sure his airway is clear, put him in the recovery position and monitor pulse and breathing. Loosen his belt and collar. His breathing and pulse should be fairly normal if it is a simple faint and he should recover consciousness fairly quickly. A weak rapid pulse and/or continued unconsciousness suggest some other more serious problem.

Gastric Upsets: Bad food, polluted water, or poor hand washing hygiene may cause stomach ache and vomiting or diarrhoea. If diarrhoea occurs check for allergies to drugs before giving a diarrhoea suppressant such as Diocalm. The symptoms should stabilise within a few hours during which time the patient should eat nothing but rest and drink plenty of water. It is advised that the first aid kit should include rehydration sachets that can be dissolved in drinking water. If the situation has not stabilised within 24 hours then a serious problem requiring medical assistance may well exist, with the patient weakening rapidly and dehydration becoming a real threat. In very bad cases beware of Shock (Sec. 8.2)

Headaches: This common hill complaint is mainly caused by dehydration, often aggravated by bright light, heat, and heavy exertion. *(See Appendix C).* Get the sufferer to drink water in repeated small quantities. Check which tablets the casualty

normally takes for headaches and, if he is not allergic to them, let him take Paracetamol or Ibuprofen. Relieve secondary factors. For example wear sunglasses and a floppy hat on a hot bright day.

Infected Wounds: Any break in the skin can become infected and all hill walkers should have an up-to-date immunisation against Tetanus, which is a potentially fatal disease most often associated with land occupied by grazing animals. Happily Tetanus is very uncommon, but localised infection of wounds occurs frequently. Localised infection is indicated by the area around the wound becoming red, swollen and later producing a yellow discharge. Clean the wound and apply antiseptic cream and a dressing. If it does not improve then seek the advice of a doctor for anti-biotics may be needed. More serious signs of spreading infection are red lines running up a limb and a lump in the armpit or above the fold of the groin showing that the infection has spread to the lymphatic system. If this occurs then an urgent visit to a doctor or A & E unit is required.

Muscle Pain: Quite separately from the question of strains or sprains, undamaged muscles may cause pain due to over exertion or chilling. Some muscle aches such as fibrositis can produce a pain similar to toothache which may need pain killing tablets for relief. If a walker has stiff leg muscles in the morning, then do not force him into very hard effort too soon otherwise real muscle damage may follow. It is good practice to do a light warm-up and a stretching programme before the start of a walking day.

Nose Bleeding: Some people are prone to spontaneous nose bleeds and others bleed easily with a light impact on the nose. To stop the bleeding, pinch the fleshy part of the nose and hold firmly for about 10 minutes. This should be successful but the casualty should be told not to blow his nose for some time. Do not insert plugs into the nose as their later removal will re-start the bleeding. If a drink is requested it should be cold.

Scalds: A scald is a burn inflicted by a hot liquid. The damage is the same as a burn and the treatment is the same. Immediate immersion in cold water for an **extended** period is the best treatment, because this will reduce swelling, blistering and scarring. Do not warm up a burn or scald by applying thick dressings. Instead protect the damage with a non-stick loose dressing of minimum thickness.

Splinters: Splinters of wood or metal from fences, poles, stoves etc., often find their way under the skin. They should be removed without delay as they will otherwise become a source of irritation and infection. In expedition situations you may have to tackle the removal of some splinters that would be referred to a doctor if you were at home. Sterilise a needle or

a pair of tweezers by holding it in the tip of a hot blue stove flame until it glows red and clean the wound with antiseptic. Once the needle / tweezers have cooled, use them to work the splinter back out along the track by which it entered. Make sure you get it all out and then clean and cover the wound. Do not try to remove very large deep splinters which might be close to veins or arteries. Protect these against movement and go to an A & E unit.

Sprains, Muscle, Tendon and Ligament damage: Twists, jerks, sharp unbalanced movements and falls cause these injuries. The result can be severe pain, swelling and loss of mobility. In many cases the first-aider will be unsure whether the problem is soft tissue damage or a minor bone fracture, and he will have little option but to treat the injury as a fracture until he is sure. The injury should be chilled with cold water, then supported with a firm bandage and rested in an elevated position. This will help to reduce bleeding into the damaged tissues. Obviously if you suspect a fracture it will be necessary to treat the injury as gently as possible. Avoid further walking on a sprained or strained limb if at all possible, but in low risk situations sprains and strains will be worth leaving overnight to see how they have progressed by the following morning. The best support bandaging for ankle injuries is wide elastic adhesive strapping which provides very strong support without making it impossible to wear a boot, (but put it on with care to avoid restriction of circulation.)

Stings: Bee or wasp stings, while painful are not usually dangerous, however a very few people have a violent allergic reaction to such stings called Anaphylactic Shock, especially if stung in the vicinity of the mouth when rapid swelling may block the airway. Most people who suffer from anaphylaxis - or have other violent allergic reactions, carry the antidote with them, which is called an epi-pen. One of your checks before an expedition should be if anyone has such a vulnerability in which case he needs to be carrying an epi-pen with him, *and you as leader need to know exactly where to find it - quickly.* If you get such a reaction your first move is to get the epi-pen, and have the casualty inject himself. If that doesn't solve the problem, *(or if the casualty didn't know he had such a vulnerability and thus has no epi-pen),* you will be facing a life-threatening emergency and should do your best to keep an airway open and carry out resuscitation if required. If summoning a rescue team for such a problem, make sure that they know that they are dealing with anaphylaxis so that they can bring the correct antidote. With a bee-sting remember that the sting itself may be left in the wound and it must be removed without squeezing it or you may inject even more venom. If someone recovers from the consequences of an anaphylactic reaction after using an epi-pen, you need to give him an extended rest under supervision and abandon the expedition. Whether you need to summon a rescue will be a decision dependent on the location of the party and the

casualty's condition after the rest period, but he certainly shouldn't be called upon to make a serious physical effort, and it would be advisable to get medical advice before moving him.

Sunburn: Do not expose untanned skin to the sun for any length of time. Remember that the air is clearer and the ultra violet-light content is greater in the mountains, so the risk of skin cancer is greater. Use high factor waterproof sun tan creams. Remember that skin wetted by salty sweat burns worst and the neck, ears, nose, forearms, front of the thighs, back of the knees, and back of the calves tend to suffer the worst damage. If large scale sunburn occurs, especially if blisters are involved then treat the casualty as the victim of a major burn and beware of shock. Serious sunburn is dangerous and not at all funny.

Throat Infections: Many sore throat treatments are too strong and do more harm than good. Gargling with salt water is a good mild antiseptic and the group first aid kit should contain some of the milder lozenges such as Merocet, which should be issued sparingly after asking if the patient has any allergy to them. If the problem persists see a Doctor.

Toothache: If this should occur, start by advising the sufferer to avoid hot or cold drinks and not to breathe cold air with his mouth open. If the pain does not subside, check for swelling or extreme tenderness which may suggest an abscess (*a nasty deep gum infection*). Abscesses need early treatment by a dentist. If the toothache does not go away, check that the casualty can safely take pain killers, and if so allow him to take ibuprofen or paracetamol with careful attention to maximum dosage, and after a check that he can take them safely. Never leave boys who have toothache in possession of their own pain killers, for they have an incentive to overdose themselves.

Dundee & Angus Battalion's Outdoor Centre, Scott Lodge, at Glen Clova in Angus. Available for booking on the Internet at modest cost. Just Google "Scott Lodge"



8.2 MANAGING SERIOUS MEDICAL CONDITIONS

This section, dealing with the worst emergencies, is deliberately brief in acknowledgement of the fact that this Expedition Manual is not an appropriate place to attempt comprehensive advice on such difficult and specialised matters. The advice that is given below pre-supposes that you have read and will follow the Emergency Procedures given in Chapter 7 and that you are competent in all of the special techniques listed below. All of these are too complex to be described here and students are expected to seek practical training to the appropriate standard from a nationally recognised First Aid organisation. The required techniques are:-

Mouth to mouth and mouth to nose resuscitation	The risks associated with spinal injuries
A manual respiration technique	The transportation of serious and spinal injuries
Clearing an airway	The recognition and treatment of Shock
External cardiac compression	Monitoring a pulse
The recovery position	Checking States of Consciousness
Stopping serious bleeding	The treatment of drowning

Signs of Normality and Abnormality

The recognition of serious medical conditions often involves situations in which the casualty is too ill or too injured to answer your questions, so a basic ability to recognise normal and abnormal reactions is important. Some key indicators are as follows:

Respiration: Typically 14-20 times per minute in an adult at rest. Faster in children. There are many individual variations.

Pulse: 60-80 beats per minute in an adult who has been at rest for some time, with many individual variations, and faster rates in young children. Pulse is best measured at the Carotid artery in the neck. If you cannot find a pulse, an important second check for circulation, - is to look for a response from the iris of the eye. If the iris does not open when shaded or,

as a better test, - contract when a torch is suddenly shone into it, then you can be pretty sure that there is no effective circulation, i.e. the heart has stopped functioning. Get training in this from a proper first aid course.

Consciousness: This is normally classified into four states and monitored at intervals of 15 minutes

- A = Alert** The casualty can answer questions sensibly and does not lapse into sleep.
V = Voice The casualty is drowsy and may lapse into sleep, but can be roused to answer simple questions.
P = Pain The casualty is unconscious and cannot be wakened, but will flinch if pricked with a pin.
U = Unresponsive The casualty is very deeply unconscious and does not even respond to pain.

A casualty who lapses into ever deeper unconsciousness when checked at regular intervals is in very serious trouble and the earliest feasible transfer to a Hospital Casualty Unit is essential.

Asphyxia: This is the term used to describe a shortage of oxygen in the blood and can be caused by an obstruction in the airway, a failure to breathe or a failure of the heart, blood circulation or blood composition. The signs of asphyxia can include:

an absence of breathing harsh or noisy breathing blueness (cyanosis) of the lips, fingernails, face, etc.

Shock: This condition is caused by a shortage of sufficient blood and fluids in the body to meet the demands of the system. It is potentially fatal and can result from external or internal bleeding, loss of plasma in burn cases, dehydration (*acute vomiting/ diarrhoea, exposure or heat conditions*), heart attack, or intense emotional fright.

The main signs are:

<i>Fainting, giddiness, restlessness</i>	<i>Sickness, vomiting, thirst</i>
<i>Pallor, coldness, clammy sweating</i>	<i>Rapid shallow breathing</i>
<i>Rapid weakening pulse</i>	<i>Unconsciousness</i>

Treat Shock by getting the casualty to lie down, ideally on his back with his feet slightly elevated. Insulate him and above all - deal with the underlying cause.

Priorities in the Treatment of Serious Casualties

In any situation in which serious casualties have to be given urgent treatment there are recognised priorities which help the first aider to decide which among a range of major problems he should treat first. This advice cross refers to Chapter 7 and in particular to Actions 2, 3 and 4 of that Chapter.

The guidelines below do not imply that the lower priority problems are necessarily less dangerous, rather they reflect the time period over which they are a threat to the casualty. The recognised priorities once you have secured the party against further risk are as follows:

Priority One: Breathing and Circulation: Get all of the casualties breathing properly. Open and clear their airways, re-start breathing and check that the heart is functioning properly. If this should fail then apply both cardiac resuscitation and artificial respiration. Once successful, place the patient in the recovery position. *(other injuries allowing).*

Priority Two: Bleeding: Deal with serious bleeding *(which is really an element of circulation)*. The priority is to stop massive bleeding from arteries and veins. Do not mess about with lesser wounds at this stage and remember that even quite small quantities of blood can look very alarming without being a big threat to the patient. Use direct and indirect pressure to stop bleeding.

Priority Three: Broken Bones: This only relates to major fractures and not to minor injuries. Major fractures, especially if they are open fractures may be gruesome injuries causing the casualty great pain but unless arteries or veins have been torn they will not threaten life as quickly as the top two priorities. These injuries should be supported and immobilised.

Priority Four: Burns and Scalds: The only reason for burns and scalds to be the fourth priority is the timescale over which they are a threat. Unless other desperate problems are present, large scale burns and scalds should be treated by the *immediate* chilling of the affected area with cold water. Remove clothing *(unless the burn is very bad and the clothing is charred into the wound)*, rings and jewellery from burned or scalded areas and continue the chilling for an extended period. Keep burned fingers separate. Insulate the casualty but do not heat him up.

8.3 SPECIALISED MEDICAL CONDITIONS ASSOCIATED WITH EXPEDITIONS

8.3.1 Cold Induced Illnesses and Injuries

Accidental Hypothermia: (Exposure)

This condition is the single biggest killer in the hills and can easily be encountered during summer expeditions. Exposure is often the potentially fatal secondary condition which finishes off a moderately injured casualty during the course of a long wait for rescue. The most common kind of Exposure occurs when the victim has suffered a continuous loss of body heat over a long period, such as at the end of a very long hard day in low temperatures, cold wind and rain soaked clothes. It can and does occur in temperatures well above freezing. There is a second kind called Immersion Hypothermia which affects people who have been immersed for some time in cold water, but it is unlikely to be an issue for Expedition groups.

In cases of Exposure the body reaches a point of energy loss at which it no longer has the reserves to maintain the vital steady temperature of the brain and body core, and as the core temperature falls progressively below normal, progressively worsening symptoms will show. These symptoms may be:-

1. Complaints of coldness and tiredness	2. Pallor of the skin
3. Coldness to the touch	4. Intense uncontrollable shivering
5. Failure of co-ordination (after shivering)	6. Slurred speech
7. Lack of comprehension	8. Blindness or abnormal eyesight
9. Low pulse and respiration rates	10. Unconsciousness

These are not all of the possible symptoms, which can include such oddities as violent outburst of unexpected energy, and they do not all occur in all cases. A tired cold party must be vigilant for exposure symptoms in any member, and anyone trailing or struggling should be watched with care and not shouted at for being slow *(-the typical reaction of a cold tired party to the first signs of exposure in its weakest member.)*

Treatment: Stop as quickly as possible and get the casualty into a tent or shelter. Remove his wet clothes and dab rather than rub him dry to **avoid** stimulating surface blood flow. Replace wet clothes on a one-for-one basis so that the skin is not

left exposed and place the casualty in a sleeping bag and on an insulating mat without delay. If the symptoms are not too far advanced then the casualty should be able to be returned to normal by the provision of a warm atmosphere and warm sugary drinks, (not hot enough to scald). Get a carefully managed stove going in the tent to warm up its interior, but remember safety and ensure good ventilation. Monitor the casualty and make sure that his improvement continues.

If the casualty has deteriorated badly he will not recover his temperature from his own internal resources, nor from any simple supply of a better environment by his colleagues. In such cases the patient may continue to decline into coma and death unless action is taken safely to introduce considerable extra warmth to him. It is important, indeed crucial, not to increase the surface blood circulation in a very cold body. So do not rub the casualty's skin, *never ever* give him alcohol, and do not apply hot water bottles to the feet or limbs because they will stimulate surface circulation before the body core temperature has been brought back to normal. For technical reasons a rapidly re-warmed exposure victim may go into dehydration induced shock. Carry out re-warming gradually. The best treatment is to put the fittest and warmest of his colleagues into the same sleeping bag as the casualty because body trunk contact between a fit person and an exposure victim is the best means of transferring heat safely,- but keep a careful check on the condition of the heat donor. The limbs of the casualty should be insulated to keep them from getting warm too soon, but it is evident that the maximum heat transfer from colleague to casualty will take place if neither is very heavily clad. Concentrate insulation outside the sleeping bag and keep the heat donor well supplied with sugary drinks and chocolate bars to keep his temperature up. As soon as the casualty is properly conscious encourage him to take warm and very sugary drinks. Once he has been warmed up do not let him get cold again, and remove him by stretcher if he cannot receive an extended rest (with proper food and dry clothes) at the treatment location. Always refer a recovered exposure victim to a doctor for a medical check. Since the symptoms of bad exposure include very faint pulse and respiration it follows that very careful attention must be paid to detecting the heartbeat and breathing of very bad cases. Don't be quick to assume that a victim of exposure is dead just because you cannot easily detect a pulse or breathing.

Frostbite: This is the result of intense cold affecting the extremities of the body and is normally only associated with winter expeditions. It is very unlikely that anyone carrying out normal expedition work will ever come across this condition. Frostbite can occur on very cold days especially if there is a cold wind. Essentially the temperature must be below 0 deg. C.

Wet feet, wet gloves and lack of gloves are often contributing factors and the damage which occurs will not be felt at the time because of the frozen nature of the tissues involved. A victim of frostbite may complain of a prickling pain in the affected part followed by increasing numbness. Movement may be impaired, the skin may be hard and stiff, and its colour will be waxy white or mottled blue.

Treat by drying the affected part and gently warming it with body heat, (*e.g. hands under the armpits*). Alternatively immerse the affected part in warm water in which the first aider can **keep** his hand without scalding. Remove rings as soon as you can. Once a foot has been defrosted it must not be walked on, indeed any essential walking is best completed before you defrost the foot. Hospital treatment will be needed afterwards, for circulatory damage and tissue damage may be present. If not properly treated frostbite may turn into the very dangerous condition of gangrene.

8.3.2 Heat Induced Illnesses

There is increasing awareness that hot conditions can be just as serious a risk to life as cold and damp. In recent years a number of deaths have occurred in military personnel testing themselves to the physical limit in hot conditions while carrying heavy loads. Although the military circumstances were more severe, there are parallels to a heavily laden and overdressed backpacker climbing a big steep hill on a hot day. Critical problems can result from the overheating and dehydration of a body, and in extreme conditions an irreversible collapse of dehydrated internal organs can take place over little more than 15 minutes. Avoidance is essential and the key precautions are as follows:-

- Don't overdress on a hot day
- Protect your body and head against the sun with light clothes and a hat
- Rest in the shade during the hottest part of the day
- Replace your body fluids frequently with water based drinks
- Carry a 1 litre water bottle on high level walks
- Never ever drink alcohol in such circumstances, (*and don't go out with a hangover which means you're dehydrated already*)

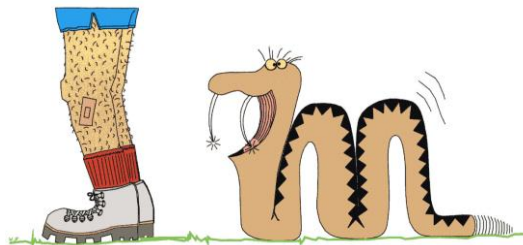
Dehydration is the principal danger during hot weather. This is caused by a lack of sufficient water in the body and in extreme cases by a lack of salts as well. However problems with salt deficiency only occur after days of heavy work in hot conditions, and salt replacement should not be attempted except on medical advice, as there is far more chance of it worsening rather than improving matters. Table salt is simply not the right kind of salt! The symptoms of hot weather

dehydration include shock, exhaustion, and muscle cramps of the legs and abdomen. Breathing will become fast and shallow and the pulse rapid and weak. The casualty may faint. Cool him and if he is conscious make him take frequently repeated modest sized drinks of cool water over an extended period, but do not allow him to drink lots quickly. Expert advice is that you should have rehydration sachets in your first aid kit and would mix these in the water given to the casualty.

8.3.3 Snake Bite

The only poisonous snake in Britain (*and the only snake of any kind in Scotland*) is the Adder. It is important not to exaggerate snake bite risks. Adders are not vicious, and the cartoon on the right isn't meant to be taken seriously. They will only bite you if you stand on them, surprise them, or go too close to them if you have one cornered. Warm, dry, vegetated areas are the most likely places to encounter snakes, and that almost always means a valley environment. Cold, high mountainsides are not adder country.

An adder bite should not threaten the life of a healthy adult or teenager, but it would make the victim very ill and in need of urgent treatment. A casualty bitten by an Adder will suffer two puncture wounds and the area around the bite will start to swell - the sure sign of a venomous bite.



Encourage the wound to bleed, but do not cut or suck it. Keep the bite site as low as possible below the heart and keep the casualty lying down, still and calm. Re-assure him and insulate him. Start a regime of monitoring pulse, breathing and state of consciousness, and prepare yourself to administer artificial respiration and cardiac resuscitation in case they should be necessary. Send for urgent help and make sure that the messenger tells the Police that an Adder bite is involved.

Some sources recommend killing the snake and keeping it as a check for the authorities. This is unacceptable in wildlife terms, and picking a fight with an angry adder is hardly to be recommended, - so leave it alone!

August 2011. An adder in the Inverpollly National Nature Reserve, en-route to Suilven.
Its head is bottom centre staring straight at the camera. The threatening hiss was impressive!

8.3.4 Tick Bites and Lyme's Disease.

A "Tick" is a small roundish/pear-shaped blood-feeding insect, often black in colour, which attaches itself to large warm blooded animals - including humans. It burrows its jaws into their skin and sucks their blood over a period of several days until its abdomen is swollen with that blood, and then it drops off. However they are very (very) difficult to pull-off because of their barbed jaws. A tick can be as small as 1 millimetre across, - and therefore hard to spot. However a big adult tick can be anything up to 6mm across. Bites from very small ticks probably pose less of a risk.

A tick usually gets onto you by climbing up the stalks of tall plants such as heather and bracken, and then dropping onto your clothing or skin as you brush through that long vegetation. Once they land on you they crawl towards warm soft parts of your body, seeking an easy place to dig-in. Thus your upper legs, groin, waist and upper arms are likely target areas. However they can, and will, bite you almost anywhere, so you have to check everywhere, *and especially groin and stomach*. We have experienced tick bites on shins, ankles and shoulders as well as the areas mentioned above. You will not feel a tick biting you and you won't feel any irritation at the start, - but will later, - maybe days later. Thus you are unlikely to have the slightest idea that you have a tick on you unless you check your skin, - and get others to check the bits you can't see - including your head. It is possible that a tick could bite you and drop off again without you ever knowing it was there. Experience so far has been that the first check often doesn't find ticks. Often you don't find them until a day later when they have dug in and caused a local red swelling, with the black spot in the middle being the tick!

Some ticks can transmit a bacterial infection called Lyme's Disease, which can be very nasty, but the better news is that:-

- A relatively small percentage of ticks carry the disease, and even if the insect carries the disease there is little risk of you getting it until it has been on you for more than 24 hours.
- If you do catch Lyme's Disease then early treatment with common antibiotics from your Doctor has a very high level of success in curing it with no harm done.
- In highland areas with large populations of sheep, deer etc., some of the human population carries anti-bodies to Lyme's disease and is therefore immune, - but you're unlikely to be immune if you are a "townie".

Don't panic if you find a tick on you, and don't treat it as an emergency! You haven't been bitten by a Black Widow! However it is wise to check for ticks regularly, - say each evening during an expedition that is passing through long vegetation. Grip the tick with sharp tweezers right at the skin surface, and lift it off without squeezing its abdomen, - so that you don't inject infection into yourself. Narrow/sharp-pointed tweezers should be carried on each expedition.

You also need to be aware of the symptoms if you should ever be unlucky enough to contract Lyme's Disease. The first symptoms would occur sometime from three days to about three weeks after the bite. If, during the few weeks after a tick bite, you get any of the following symptoms then you should go promptly to your Doctor and tell him you suspect Lyme's disease from a tick bite. **Don't ignore it: It won't just get better.** The real risk arises if you leave it untreated, when it could cause you very serious long-term health damage. The Doc will probably tell you that it isn't Lyme's disease, - but it's better to be safe than sorry. The main symptoms are: -

- The site of the tick bite (*often an itchy red spot*) gets surrounded by an expanding circular rash. 75% of infected persons experience this rash between 3 and 30 days after the bite. The rash gradually expands and may form a ring up to 30 cm (12 inches) across.
- As well - or instead, the patient may experience tiredness, chills, fever, headaches, aching muscles and aching or swollen joints, - most often knees. Note that you may experience these instead of the rash. So the bottom line is that if you suffer what feels like a virus illness (*i.e. cold or flu*) within a few weeks of a tick bite, then you should go to your Doctor and tell him about the tick bite and the symptoms.

Climate change is making ticks more common but, thousands of people work in the Highland countryside all the time without huge epidemics of disease occurring. Nor is it new: This writer was first bitten by a tick in 1964!

It is sensible to wear long trousers, and perhaps also gaiters if walking through long vegetation in a high tick risk area and also applying midgie repellent to legs - even under the trousers is a further tick deterrent. Geranium Rose Oil is also now advocated as a deterrent that only needs a few drops applied - but the jury is out on whether it works! However no preventative is perfect and a need for regular checking will remain. Accept ticks as a natural expedition hazard and learn to manage the risk. If we check for them regularly, remove any we find, and go promptly to the Doc if we get a rash or viral illness symptoms then there shouldn't be cause for alarm.

8.3.5 The Relationship of First Aid to Food and Drink

One of the most dangerous things done unwittingly by persons in charge of casualties, is to give them food or drink at the wrong times.

A general, but not absolute, guideline is that casualties should not be given food or drink. Digestion makes demands upon the body's blood supply, and in the case of impact injuries the internal digestive organs may have been damaged. So food or drink could cause internal organs to rupture, and digestive blood demands could fatally strain a system that has lost a lot of blood. Another problem is that a casualty cannot be given a general anaesthetic for four hours after taking food or drink.

Never, - in any circumstances whatsoever, give any casualty alcohol. There is no problem, including hypothermia, that is not made worse by alcohol.

You can give food and drink in the following circumstances:-

- Some poisoning cases may be given drinks of certain kinds, but you have to know the rules, and this isn't the place to try to explain them.
- Fully conscious exposure victims should be given warm sugary drinks and easily digestible foods, but only in small amounts at a time.
- Dehydration victims, if conscious, **must** be given repeated sips of cold water without delay, - but on a little-and-often basis.
- A casualty who is not in shock and evidently doesn't have internal injuries might be given a little food and drink if he faces a very long wait for rescue. You have to judge this on a case by case basis.



A rest break below Stob Ban on the Lairig Leacach, Lochaber.



At about 8300 ft, climbing to cross the Fenetre D'Arpette col, Valais, Switzerland: July 2019

Chapter 9: Access & the Environment

'Ruurgggghhhh urgggh urgh urgh'.....continued the creature. 'The general gist' said Ford... 'is that we are welcome to continue our journey, but if we would walk round his village it would make them all very happy.' 'So what do we do?' said Arthur. 'I think we make them happy.' said Ford.'



The Restaurant at the End of the Universe

9.1 ACCESS

One of the fundamental and most often forgotten facts about countryside recreation is that it invariably takes place on someone else's property. All land is owned and nearly all land has some kind of value which the owner has the right to obtain and which may be reduced by the intervention of the public. The legal position that faces hill walkers is ambiguous and greatly complicated by the fact that England and Scotland have separate legal systems which contain quite different provisions on the question of trespass. This comes out quite clearly on Ordnance Survey maps. The English 1:50,000 sheets show rights of way in red and other paths in black. The Scottish sheets show all paths in black.

In England the trespass law is clearer but much more draconian. If a walker is present on land outwith a Right of Way and does not have the consent of the landowner then his presence can constitute an offence under the English Criminal Law.

Scottish Law on trespass was never as severe as that, and the Scottish Parliament passed the *Land Reform (Scotland) Act 2003*, which further strengthened 'right to roam' and public access principles. It even contains provision for camping, biking and canoeing - but with important safeguards for country residents and land-owners. The Scottish Criminal Law now retains only very limited provisions regarding trespass, mainly for the purpose of preventing illegal long-term encampments. These provisions would not be used against a walker who had done nothing more than be present on private land. On the other hand the Scottish Police might make an arrest under other legislation if presence on private land (*e.g. in someone's garden*) constituted a nuisance. There's always another law that will get you if you behave badly!

The provisions of the Scottish legislation still require recreational users of wild land to act with respect for local lifestyles and land uses. Thus the appropriate approach must still be based on taking care not to damage local interests, and it is good practice to contact landowners if there is any doubt. Boys' Brigade parties in Scotland are especially urged to exercise

restraint on movement within certain areas during the game shooting seasons. Game shooting is also now an increasingly important control measure to stop the destruction of young trees and plants by animals.

While landowners in England and Scotland have varying rights under the Criminal Law, be aware that they all have wide rights to take action under the Civil law if they can prove that a walking party has done damage to their property or their commercial interests. The threat of being sued for compensation might not keep you off land on a particular day, but could turn out to be very painful in the longer term!

We should start from the basic viewpoint that a landowner has a moral right to the peaceable enjoyment of his land and that we have a clear duty to promote mutual tolerance by taking care not to disrupt the reasonable activities of the landowner, and in particular his farming or sporting interests. The Duke of Edinburgh's Award requires all expeditions to have the prior consent of the landowners. This should be seen as sound practice for any expedition if the view of the landowner is in any doubt. Various publications provide contact information for landowners and your Local Authority Outdoor Activities Resource Centre should have the appropriate publication for the area that you have in mind, failing which the Reference Section of your local main library should be able to help.

From time to time disputes over access will arise, but it should be made clear that Boys' Brigade parties must not become involved in access disputes. Any officer feeling aggrieved by the refusal of access by a landowner, - however unreasonable it may appear, must not take boys on to that land. If he wishes to pursue the matter then he must do so as a private individual and not do so on behalf of the Boys' Brigade.

However if, while a party is on private land, it is told by the landowner to leave at a time or in a direction that would put the party at risk, then the safety of the boys always comes first. If that obliges you (*with as much tact as possible*), to defy the land owner, - then so be it!



Nearing Kinloch Hourn: Knoydart: August 2018

9.2 THE ENVIRONMENT

"..... This we know. The earth does not belong to man; man belongs to the earth. This we know; all things are connected like the blood which unites one family. All things are connected. Whatever befalls the earth befalls the sons of the earth. Man did not weave the web of life; he is merely a strand in it. Whatever he does to the web, he does to himself. Even the white man whose God walks and talks with him as a friend cannot be exempt from this common destiny....."

American Indian Chief Seattle: 1854, in a letter to President Franklin Pierce.

Hill walkers, and those who travel through the wilderness by other means, are unintentionally among the most destructive users of the mountain environment because they cause damage at remote sites where it is hard to carry out repairs or cleaning. The last decade has seen a very large increase in hill walking, mainly as a result of its promotion by educational bodies, including the Boys' Brigade. **We** are part of the problem!

This increased level of activity has been imposed on natural communities of animals and plants which are often very fragile because they exist at the very edges of climatic tolerance of plant and animal life. Any extra pressure can therefore cause very long term damage. In mountain areas many popular paths have become wide bands of churned swamp or eroded rubble. Many camp sites have discarded litter and toilet waste under every rock while the scars of camp fires- created purely for entertainment, have ruined the grass. The deterioration of the natural environment will accelerate unless there is a major change in user behaviour.

The first step towards a cure is the recognition that **we** have a problem and that **we** are part of the cause. Thus far most hill walkers do not see themselves in this light, yet their behaviour leaves a great deal to be desired, often as a result of ignorance rather than malice. Much can be done to improve the situation through education and the Boys' Brigade can help to lead public opinion on these matters. We can provide our boys with sound environmental knowledge and cultivate good habits and in due course they, as the leaders of the future, will pass on these attitudes.

This teaching has to start from the recognition that urban boys have been brought up in circumstances which encourage bad environmental habits. If something gets vandalised in a town then it gets repaired. If litter is dropped in a town then the Cleansing Department picks it up. Dirty water and toilet waste disappears down urban drains and is never given another thought by town dwellers. Small wonder that children brought up in such circumstances which cushion them against the consequences of their lifestyle, are inherently inconsiderate when they first go into the hills.

The main principles of environmental education (- in addition to the Country Code which is given in Appendix D,) are as follows:-

Promote Understanding Include teaching on the protection of the environment in your course and make sure that the boys understand why it matters.

Spread the Load Erosion mainly derives from the volume of use of popular areas and popular routes. Choose little used routes and sites.

Eliminate Refuse Achieve 100% return of refuse to civilisation. With care this is possible. Empty food tins, once washed, function well as bins for other waste.

Control Toilet Arrangements Nominate suitable toilet areas and ensure that all toilet waste is properly buried, with vegetation skilfully removed and replaced afterwards.

Ban Camp Fires Camp fires are highly destructive of native vegetation, and they are invariably created purely for entertainment.

Ensure Fire Safety Control and supervise all cooking. Keep a fire bucket on site. Choose sites away from loose dry vegetation. (See Appendix E.)

Minimise Footpath Erosion Place your feet with damage reduction in mind. Don't follow new lines through wet or eroded areas - it simply worsens the damage.

Ban Destructive Boys Some boys simply will not change their urban ways and will continue to drop litter and cause damage. Ban them from expeditions.

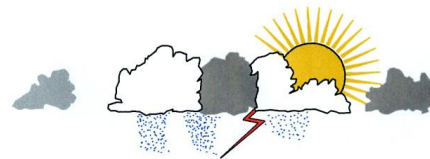
Protect Fences Fences are the means by which trees are protected against destruction by grazing animals. Close gates and cross fences with care.

Finally you should recall that all expeditions need to have a purpose. Some expeditions could have the purpose of environmental repair. Could you do a litter clean-up at a favourite camp site? Could you repair an eroding path?

Chapter 10 Basic Weather

" Marvin paused in his weary circular plod. ' The dew' he observed, ' has clearly fallen with a particularly sickening thud this morning.' "

Douglas Adams



10.1 THE NATURE OF THE BRITISH CLIMATE

The British Isles are located at a high northerly latitude that would normally have a sub-arctic climate. That these islands are temperate is due to the moderating effect of relatively warm ocean currents and cyclonic weather arriving from the Atlantic Ocean in a persistent South-West to North-East trend .

This oceanic influence fights a continual battle with different weather influences coming from the Arctic and from the Continent so that the main characteristic of the British climate is that it is variable and unpredictable within a pattern of four distinct seasons. What this means for an Expedition leader is that, when he plans his trip well in advance, he will have no way of knowing whether the weather will be clear or misty, hot or cool, wet or dry, windy or calm. The basic principle of Expedition planning is to eliminate uncertainty, yet weather imposes a major variable over which there is no control at all. This is one of the great weaknesses of Expeditions planned far in advance to meet the demands of award testing supervisory bodies, and it underlines the need to choose routes for 'test' expeditions that will remain valid and workable in almost any foreseeable weather.

10.2 BASIC RULES

Weather is a very complicated subject, and attempting to forecast it on an amateur basis is an unfailingly humbling experience. The best advice therefore is that you shouldn't try! At the present time high quality professional forecasts are available through radio and television services, with the forecasts on BBC News 24 and Sky News being particularly frequent and detailed. You can obtain a 5-day forecast on the BBC internet site. (bbc.co.uk/weather) now accessible on most mobile phones. Radio Scotland has a forecast for Outdoor Activities shortly before 7 p.m. each day.

If you carry a radio and/or make use of the internet forecasts you should be able to avoid being badly caught out by the weather, but beware of the very many Scottish routes where radios may not work and mobile phones will not get a signal.

The further comments in this Section are not for forecasting purposes, but comprise general planning guidance for the unwary. Weather is widely different in the various parts of Britain in which expeditions take place. Some very simple rules are listed below, - comprising little more than common sense. These are probably known to most people but they can help an expedition planner to judge the relative weather risks that he may encounter. They are:-

1. The west of Britain is much wetter than the east.
2. Mountains are wetter than lowlands
3. The north of Britain is significantly colder than the south
4. High altitude is colder than low altitude
5. Mountain groups are colder than isolated mountains
6. High altitude is windier than low altitude
7. The Scottish Spring is a month later, and the Scottish Autumn and winter a month earlier than in the south of England.



A wet morning at Barisdal in Knoydart,
below Ladhar Bheinn.

It is, of course, not uncommon to find these rules reversed on a particular site and on a particular day. Nevertheless they provide a sound planning tool for an expedition leader, because they represent the dominant pattern. In the words of "Runyon's Law"

"The race is not always to the swift, nor the battle to the strong,.....but that's the way to bet!"

When using these simple rules to assess what you might face in different parts of Britain, remember that the factors apply in combinations and multipliers. Big ranges such as the Mamores (east of Fort William) are not just cold because they are in the north, they are colder again because they are a big group of large mountains, and very much colder again because of their great height. In addition they are wet because of their height, wetter again because of their westerly location, and windy due to their height and westerly exposure. Even subjectively the factors have to be combined to give a realistic impression of what a party might face.

10.3 THE MOUNTAIN SEASONS

Perhaps the most common and dangerous mistake made by lowland dwellers is that they underestimate the difference in the pattern of the seasons between lowland and mountain areas, or even between a valley and the mountains that surround it. The main problem arises in the lowland Spring, when enthusiasts have been '*cooped up*' through a long winter. April and May days in the lowlands can be warm with lots of Spring growth, and even the experienced quickly forget just how bad the weather on the high tops can be at these times. This misjudgement is compounded by those who drive north to Scotland in the Spring, forgetting that the Scottish Spring is often a full month behind the south of England. Mountain weather during April and May can range from one extreme to another on a week to week basis, just depending on which air mass has gained influence for a few days. This author has experienced sub-zero temperatures and knee deep snow at the 600 metres level in mid-May. This is a time when many parties of boys are out on the hills and any unaccompanied group would have been in dire trouble in such conditions. Such weather may be unusual, but it has happened and it will happen again.

In the higher mountain areas winter occupies all of the period from the beginning of November until the end of March, with the risk of severe weather before and after these dates. In December and January in Scotland there are only about 7 hours of proper daylight out of each 24. May to September is the recommended 'season' for expedition work with care required at either end of the period. True winter in the higher British mountains can display an almost unimaginable

brutality which is difficult to convey to those who have not experienced it. The winter is no time for any B.B. expedition party to be out, and the Expedition Leadership Certificate validates leaders for 'Summer' expeditions only.

10.4 THE SIGNIFICANCE OF ELEMENTS OF WEATHER

Wind

The wind is always the most important weather element, far outweighing the effects of all the others. By itself the wind can, of course, wreck tents and cause other damage, but its real power lies in its role as a multiplier of the effects of other weather elements. When listening to a forecast, be sure that you get the direction and force of the wind.

Snow

Summer expeditions will not often encounter snow, but it can happen early and late in the season. Falling snow obstructs visibility, crushes tents, blocks roads, and chills and dampens everything. Lying snow can be associated with really low temperatures. The biggest problems which it poses are that it may be soft and loose which makes it exhausting to cross and liable to avalanche, or that it may be hard and slippery which make it lethally dangerous if it lies on a slope which the party has to cross, because of the risk of a fatal slide.

Fog and Cloud

Especially for parties of boys or for groups of any standard crossing long high level routes, extensive low cloud puts the party at risk from navigational error and certainly slows the rate of progress.

Rain

Persistent rain causes everyone to become damp, and if it is allowed to soak into the reserve of dry equipment in the rucksacks it will put the party at risk. Yet unless there is a wind or a low air temperature rain by itself should not generally pose great problems.

Temperature

Even cold weather can be pleasant provided that the party is properly clothed. On its own low air temperature is no special threat, but in association with wind, rain, or snow it can be very dangerous. Very hot weather can be a problem because of the risk of dehydration and sunburn, and because the party will tire much more quickly.

10.5 WEATHER COMBINATIONS

Whatever the significance of individual weather elements may be, the most dangerous weather conditions occur when the various factors combine. Rain or snow is greatly multiplied in effect by being driven by the wind. The effective air temperature also decreases sharply in windy conditions - a condition known as wind chill. Wind causes rain to penetrate tents and soak through clothing. Wind causes snow to combine with spindrift from the ground to obstruct vision and form drifts. The stronger the wind - the worse the problem. Wind and rain combined with low air temperatures produces a risk of hypothermia and the threat to the party becomes severe. Snow, wind and low temperatures is a killing combination and those who make a habit of venturing out into such conditions will not survive long to recount their exploits!

10.6 ELECTRICAL STORMS

"Thunder and Lightning", as it's usually called, is not as common in the UK as it is on Alpine expeditions, - where it's almost a daily risk, but it's still a problem that we have to know how to handle because it can be disastrous. Thunder is the sound explosion caused by the electrical discharge, - i.e. the lightning flash, explosively heating the air. A crude summary might be that lightning is an incredibly high-voltage static electrical discharge which sorts out differences in electrical potential between different parts of the air, or between the ground and the air. It is mainly associated with turbulent vertical clouds called cumulo-nimbus, which are characterised by their huge height, localised gusting winds at ground level, and either very heavy shower-rain or hail. But sometimes you can't see the height of these clouds through a blank sky and you have to regard any thunder and lightning as a threat.

The diagonal distance of an electrical storm threat from you, can be roughly judged by counting the seconds between the flash and the next bang. Every 5 seconds represents roughly one mile. You should first of all keep checking if it's getting closer i.e. the time is reducing. The time interval at which it becomes a threat varies according to where you are. e.g. - if you are on the top of a big plateau and have no quick opportunity to get lower down - then you need to take action while it's still far away.

If threatened by an electrical storm, you should try to get off ridges, off exposed high ground, and away from isolated high points and solitary trees. Your task is to avoid being the most attractive electrical contact! For technical reasons,

sheltering under rocks or overhangs is also regarded as risky, The best place to be is on open "dry" ground, i.e. it may be raining heavily but avoid being in standing water. Stony or gravelly ground is better. Electricity runs through ground water!

If you get badly caught out by an electrical storm that is getting really close, (*i.e. flash! -- bang!*) then the best advice seems to be:-

- Very quickly find dry ground
- Lay walking poles flat on the ground well away from you.
- Switch off all electronic devices and place them deep in rucksacks.
- Take off your rucksack and sit on it, hunched low down, **with your feet off the ground.**
- Keep a low profile
- Space the party out very widely to reduce the risk of all being hit by one lightning strike. Huddles are not good!
- Pray! - and wait until it goes away!

If your party has the incredibly bad luck to be struck by lightning, then those struck are likely to have had their heart function disrupted, - it's the reverse of using electrical shock to cure a heart attack. So focus on CPR and breathing support, and there could be a good chance of getting them back, if they haven't been directly hit.

The author has had to cope with electrical storms on a number of occasions, - successfully so far! The party might get panicky, because it can be dramatic and intimidating, not to mention cold and soaking wet - so the leader must remain re-assuring, very calm, and decisive. The boys tend to want to stay close to their friends, which is understandable, but increases the risk. Make them space out, each by a substantial distance from the other!

This picture was taken only a few minutes after the party shown had been obliged to go through the whole electrical storm procedure of sitting on their rucksacks spaced out, until the storm passed - as it quickly did.



10.7 SIMPLE WEATHER INDICATORS

"He who lives by the crystal ball, - soon learns to eat ground glass!"

Edgar Fiedler

If you are determined to try to guess your own weather forecasts then the following indicators may help, - but don't confuse luck with judgement.

- Weather patterns tend to persist. If the weather was stable before you left home then it will probably continue stable. If the weather was unstable then that too will probably continue.
- Steady rain from a flat cloudy sky will rarely clear quickly.
- Towering cumulus clouds will produce heavy showers, and can be the start of an electrical storm risk.
- A rising gusty wind often precedes bad weather
- A persistent dry South wind is a good and stable sign
- Bright clear gaudy mornings often get worse later in the day.
- Dull misty mornings are common during stable dry weather and usually clear by noon.
- Soft hazy visibility in good weather is a settled sign.
- Brighter patches in a dull rainy sky accompanied by a change from steady rain to showers, suggests a continuing improvement with colder air and the wind veering towards the north-west.
- Banners of cloud streaming from peaks are not a good sign.



Climbing Stob Poite Coire Ardair to follow the North Laggan ridge above Glen Spean

Appendix A

A U.K. Summer Expedition Equipment List:

The clothing listed includes what you will be wearing at the time of departure. This is a list for a 2-day trip.

THINK:-

WEIGHT?

SIZE?

FRAGILITY?

VALUE?

Exercise some judgement about what to take if conditions are warmer or colder than normal

Clothing and Footwear	Group Equipment
Hill walking boots	<i>(See your officer)</i>
Training shoes <i>(old, compact)</i>	Tent
3 pairs of good socks	Stove
Windproof lightweight trousers	Fuel
Spare warm tracksuit bottoms	Pan cleaners
Shorts	Cooking pots
3 sets of underwear	Tin Opener (Small)
3 x T-shirts	Food Supply
A Sweat Top	Maps, Compass, GPS (?)
Light warm windproof top, or fleece	Small notebook and pencil
A Light wool jersey	Casualty Bag <i>(if not carrying tents)</i>
Gloves (not bulky)	First Aid Kit
Warm Hat and sun hat	Sun Screen lotion
handkerchiefs	A Repair Kit <i>(see Appendix F)</i>
Cagoule (Thin waterproof jacket)	A Collapsible Water Carrier/bucket
Waterproof Trousers	
Personal Equipment	
Toothbrush, paste, and soap	Torch (Small, Light)
Towel <i>(not huge)</i>	Mug
Toilet Paper	Bowl
Money and House Keys	Knife, Fork and Spoon
Rucksack	Matches well wrapped in Cling Film
Big Strong Plastic Liner	750ml / 1 litre Drinking Bottle
Sleeping bag (compact)	Sleeping Mat

Appendix B

A Recommended Group First Aid Kit

The administration of drugs, even non-prescription drugs, must be subject to a specific prior check because of the possibility of allergies.

Many proprietary first aid kits are dominated by gauze roll-bandages, triangular bandages etc. These are almost never useful in ordinary expedition circumstances, and the reality is that if you ever really need them on a serious basis, you can make just about all the bandages (n.b. but not *dressings*) you will ever need by cutting up T-shirts! The items listed below will prove much more useful.

A soft dirt proof and waterproof pouch

Scissors and Fine Sharp Pointed Tweezers

Compeed (for blisters)

Assorted Elastoplast plasters (for cuts)

KT Tape for muscle injuries (Google it!)

Antiseptic wipes

Small Melolin dressings

Diahorrea control tablets

Rehydration Sachets

Adhesive wound closures

Safety pins.

Sun block.

A Tubigrip

Cotton wool swabs

Antiseptic cream

Paracetamol and Ibuprofen (*often better for toothache*)

(Note: Aspirin based painkillers are advised against for persons under the age of 16.

Mild antiseptic throat lozenges

Lip Salve

Appendix C: Food, Drink and Nutrition

Food is a critical element of an expedition, in terms of both energy and morale. Yet it is also an important element in the weight of the load that has to be carried, and it can impose a demanding additional set of cooking and utensil cleaning tasks, - and time burdens, upon the group. So the food you take has to fulfil your energy needs, it has to taste good so that it will provide a 'feel good' factor, it has to be lightweight and mess-proof inside your rucksack, and it has to be easy and quick to prepare. Lastly, but not least, it mustn't cause really messy plates and utensils. That is a fairly demanding set of criteria

Food comprises proteins, fats and carbohydrates. Proteins renew body tissues, and a small amount should be in every meal. Fats create slow-burn energy that lasts a long time. They aren't effective at meeting the high energy demands of hard work, but they are good at keeping you warm when you're cold. Carbohydrates are the source of bulk energy to meet the demands of hard work, and they must lie at the core of a backpacker's diet. There are simple carbohydrates such as sugar, glucose and honey, and there are complex carbohydrates such as cereals, bread, potatoes, rice, vegetables etc. Simple carbohydrates provide a quick burst of energy over a short period, - sadly followed by an energy crash if they are not renewed. Complex carbohydrates provide more sustained energy over a longer period, and they provide fibre as an important part of the diet.

An expedition menu is normally based on a substantial breakfast, a packed lunch, high energy snacks eaten on the move and a substantial evening meal. Breakfast should normally be about 20% of your energy needs for the day, and the evening meal should be about 30%. The other 50% of your needs should consist of 'action snacks' eaten at multiple breaks during your day's work.

Drink matters a great deal as well. Few people out working hard in the hills ever drink enough. Dehydration causes headaches and fatigue. In bad cases it may cause poor judgement, and increase vulnerability to heat exhaustion and hypothermia. By the time you feel thirsty, you are probably already about 5% dehydrated. A hard working backpacker should be consuming 3 - 4 litres of water per day, and more in hot conditions. So carry a good sized drinking bottle and drink from it frequently.

Suggested Foods

The items listed below have been found to be generally suitable for expeditions, but the list is far from exhaustive, - and you don't have to take them all!

Drinks: Tea bags, coffee and hot chocolate sachets, fruit squash concentrate in a small bottle.

Cereals: Rolled oats, Instant Porridge packs, or instant Muesli/skimmed milk/sugar packs, Cereal Bars.

Meats: Vacuum sealed Frankfurter sausages. Cold meats. Curries in small tins or plastic bags. Chicken in White Sauce. Corned Beef. Tuna.

Other main courses Dehydrated macaroni cheese, including sauce.

Bulk Carbohydrate: Dehydrated pasta with sauce, Uncle Ben's 3-minute rice, Smash, Dried Noodles, Vacuum sealed quick-reheat noodles.

Soups: Instant soups, especially high calorie Mug-Shot pasta.

Bread: Rolls, small loaves of sliced bread, fruit bread.

Spreads: Cheese slices, Primula, or Laughing Cow, sealed pate and meat paste, vacuum packed cold meats, jam.

Desserts: Pre-cooked puddings in plastic tubs from Tesco. Two of them taped together form an indestructible "egg": Small tins of dessert rice: cake.

Snacks: Filled Rolls, Kabanossi, Salami Sticks, Malt Loaf, Dried Fruit, Chocolate or cereal bars, boiled sweets, biscuits, nuts, trail mix, tropical mix, - jellies eaten unmixed as rubbery snacks with a high sugar content.

Tips! Carry sugar and skimmed milk powder in well-sealed plastic tubs. Little 60-piece chewing gum tubs with snap lids are great for this. Carry margarine in a strong and exceptionally well sealed plastic tub with rubber bands around it, especially in warm weather. NB. **Not** the tub in which you bought it!

Appendix D: The Country Code

Guard against all risk of fire: Never dispose of matches, bottles or shiny tins carelessly. Don't build camp fires. Don't burn rubbish. Don't smoke.

Fasten all gates: Fences and gates exist to control stock and prevent damage to crops and trees. Gates only work if they are shut!

Keep dogs under proper control: Untrained city dogs hunt farm animals and will disrupt bird nesting.

Keep to paths across farm land: Respect the farmer's work and keep to field edges. Look out for dangerous animals fenced in a field on their own.

Avoid damaging fences, hedges and walls: Don't stand on fence wire. Don't knock stones off walls. Don't cross fences at weak posts.

Leave no litter: Since there is no litter collection service in the countryside, you must not drop any.

Safeguard water supplies: Keep streams clean. Someone is probably drinking from the stream further down.

Protect wildlife, plants and trees: Look but do not touch and so maintain these things for the future.

Go carefully on country roads: Many country roads are very narrow and have blind bends. It is probably easier to have a traffic accident in the country than it is in the town.

Respect the life of the countryside: The people of the countryside have very different ways from the people of the cities. Try to understand their lifestyle, contribute to it where you can, and be careful not to disrupt their activities.



Descending to Le Peuty alongside the Trient Glacier, Valais, Switzerland, August 2019

Appendix E: The Prevention of Fire

The advice given in this appendix incorporates the lessons from a major fire started by a Boys' Brigade party. Please give it your careful attention.

The Threat: Fire is always a risk, but there is a special risk in the Spring when dead winter vegetation has dried out, and in the summer and autumn if there has been a long dry period. Any warm weather with dry air, sunshine and a breeze will render grass and heather highly combustible within 24 hours. Grass and heather fires spread above ground level and will even cross saturated ground on which there is surface water. If there is a breeze and the plants are dry then wet ground will not save you.

How to reduce the risk: If at all possible don't camp on or near long vegetation, and especially not on dry dead grass. In fire risk conditions position your camp upwind of a strong stream or lake so that any fire which does start will burn towards the watercourse. You will then be in an increasingly good position to attack the fire with water. Carry a soft collapsible plastic water bucket in each party. They cost very little and weigh only a few ounces. Keep such a bucket well filled and in the centre of the camp site. Ban boys from cooking unless there is an adult immediately on hand to deal with any emergency and make it standard practice that no cooking should be done in the morning until all members of the party are out of bed and fully dressed. Don't light camp fires or burn rubbish.

Important points to note: In any sort of breeze, a grass or heather fire can get beyond your control in less than a minute, and once it has started to burn downwind in long vegetation it will certainly become a major fire, so get large scale help swiftly. The fire may not look large at that stage **but it soon will be!** Water is the only really effective fire fighting medium. Fire beaters are pretty ineffective.

If you start a fire by accident then be prepared to admit it. You are insured by the Boys' Brigade and the ability of the land owner to gain compensation for the damage may persuade him not to close off the land to future expeditions.

Appendix F: Repair Kits

During the course of an expedition, equipment will often get damaged or come apart due to strain, wear or weather. Yet few people appreciate, - until it happens to them, that something as simple as the stitching coming out of a rucksack strap can be entirely fatal for a whole expedition plan. After all you can hardly continue with a member of your party carrying his bag by one strap, and if you are in remote country in bad weather the consequences could be serious.

So make sure that each group takes simple precautions and carries a basic repair kit that will enable the more obvious failures to be repaired.

Perhaps the most basic piece of repair equipment is a modest sized - but strong, sailmaker's needle and some unbreakable polyester sewing yarn, such as Marlow No 3 or No 4 whipping twine. These can be obtained from most yacht chandlers. Whipping twine is too strong to be snapped by hand: - It will just cut your fingers open! This is the stuff to stitch rucksack straps back into place or repair faults in load bearing tent seams. It will also, somewhat indelicately, let you stitch torn clothing back together.

The other key element in a repair kit is something to repair torn tents, clothing, or holes in groundsheets. For nylon tents and flysheets carry a length of Spinnaker Tape (wonderful stuff) - used to be available from Tiso shops, but if not try a ships' chandler. For cotton tents and for groundsheets carry a length of Duck-Tape. Hand stitching torn lightweight tent fabric *never* works. To fix groundsheet holes, DuckTape is again the best and most water resistant solution, - and Duck-Tape isn't bad on torn trousers either - if perhaps not very elegant!

Most equipment failures take people by surprise. For instance watch out for faulty gas cylinders that just don't work when they are screwed onto the stove. Test your cylinders on the stove for a few moments before you leave home. That is also a way of making sure that the stove is working properly, for food spilled on burners can clog the jet.

However the real thing to bear in mind is that a need to repair equipment during an expedition is too often the result of failing to check it properly before departure!!!!

Appendix G: Boys' Brigade's Expedition and Outdoor Leadership Regulations

The Regulation.

Any leader who is training boys and leading or supervising expeditions, or explorations, must hold an Expedition and Outdoor Leadership Certificate at the appropriate level.

Levels

The Certificate in Expedition and Outdoor Leadership is awarded at three levels:

Basic: For those who have passed the theory assessment, - allowing them to instruct boys, and to lead officer accompanied training expeditions, in moderate and familiar terrain, and in doing so to gain experience.

Standard: Entitles the holder to train boys for, and supervise, expeditions, within the limits of the Brigade Award Scheme (i.e. up to Queen's Badge or DEA Silver standard.)

Advanced: Entitles the holder to train boys for, and supervise expeditions to, DEA Gold standard. (i.e. in Wild Country).

Structure

The award of the certificate will require the completion of the following training modules:-

- 1 Equipment
- 2 Lightweight Camping and Backpacking
- 3 Navigation
- 4 First Aid, Emergencies and Safety
- 5 Expedition Planning and Management
- 6 Access and the Environment
- 7 Instructional Techniques
- 8 A Practical Assessment (at Standard and Advanced Levels)

Training in modules 1-7 may be carried out in a variety of ways, and may reflect the candidate's experience earlier in his/her BB career. Previous training will be recognised. Module 8 will include assessment in all aspects of modules 1-6 as well as a practical expedition, and it will be the final module to be taken, marking the completion of training for the certificate.

Training Involved

Training should follow the method whereby the candidate records all training and experience gained in the subject. This will allow the Brigade to take account of training and previous experience gained from a range of sources, but will exclude the final stage of certification - i.e. Module 8: the practical assessment.

Training in Modules 1 to 7.

This may be done:-

- a) at a Course run by the Boys' Brigade at Company, Battalion, District or National level
- b) at a Course run by another Organisation or Training Agency, such as Community Education, YHA, HWLC, etc.
- c) by an individual through distance learning and personal study.

Training in Module 8.

The assessment for all aspects of the Certificate will be carried out in a practical manner, at national level, by assessors appointed by the Brigade.

Completion and Validity:

Successful completion of all modules will be necessary before the Certificate is awarded. Certificates at all levels are valid for 5 years.

Certificates are valid for Summer Expeditions only, generally regarded as May to September, both months inclusive.

Recognition of External Training:

The Brigade will recognise externally operated training schemes such as the Basic Expedition Training Award, YHA Hill Walking Leader's Summer Certificate, etc.

Expeditions other than on Foot:

To supervise expeditions other than on foot, such as by canoe, yacht, cycle or horseback, leaders should hold a certificate of competence issued by an appropriate association or club, in addition to the Brigade's Expedition and Outdoor Leadership Certificate.

Expedition and Outdoor Leadership Record Book:

A Record Book is available and should be used by all candidates to record their activities and experience. This will be essential for candidates wishing to upgrade a Basic Certificate, but can also be used to prove continuing involvement and experience when the renewal of an expired Certificate is requested.

Training Notes:

The following is an indication of matters to be covered in the course of training:

Basic and Standard:

All Subjects in this Book

Plus

Instructional Techniques: (Planning a Course of Instruction, Setting Objectives, Preparing Teaching Material, Preparing a Lesson, Use of the Voice in Teaching, Audio Visual Aids, Practical Lessons, Checking and Testing.)

Plus

Practical Assessment as determined by Brigade National Staff.

Advanced

All requirements for the Basic/ Standard Certificates as listed above, - to an increased standard of competence

plus:

Equipment for Wild Country Expeditions, and related weather.

Food and Nutrition for Wild Country Expeditions

Load Carrying Techniques

Advanced Compass Navigation for severe terrain

Advanced Route Planning.

Plus

An Advanced Practical Assessment as determined by Brigade National Staff

Important Note:

In order to be awarded Standard and Advanced Certificates, candidates require to show evidence of appropriate amounts of reasonably recent backpacking expedition **experience** in a youth party context, - relevant to the level of Certificate that is being sought. Those who do not have this will initially be awarded "Basic" certificates which qualify them to go out with the boys on training expeditions - which are as much for them as they are for the boys! **But a "Basic" does not let that person send boys out on unaccompanied D of E expeditions.** A good way to gain valid experience before training would be to go out on training expeditions with boys which are also being accompanied by, or supervised by another qualified officer

*"If the time comes when you start to believe that
the current generation are not capable of doing things
at least as well as their predecessors.....
.....then you have passed your 'Sell-by' date
and it is time for you to go"*

The Royal Marines

The photographs in this book, - all (without exception) taken on Boys' Brigade expeditions, - even the Alpine ones, - are there to gain your interest and hopefully make you want to go and see for yourself. I acknowledge all of those who appear identifiably in the photos in this book, namely:-

Page 4 - Jonathan Barclay, Euan McIlvenny, Paddy Dolan, Craig Ogilvie and Steve Thomson: Page 9 - Tommy King, Stuart Watt, Garry Crowe and Russell Duncan: Page 11 - Dougie Coutts: Page 47- Andy Lowden: Page 51 -Bob Kerr and David Powrie: Page 58- Philip Miller: Page 68- Philip Miller and Luke Davidson: Page 74 - Aidan Simpson and Harry Colville: Page 76 - Leo Webster, Kai Swinton, Jamie Hendry, Kieran Simpson and Jack Donald: Page 80- Mark Scobbie, Jack Forster and Darren Johnston: Page 84-Stuart Urquhart and Max Davidson: Page 87- Mike Bruce: Page 101- Ross Czerek, Dan Hine, Mike Bruce and Steve Petrie: Page 102 - Harry Colville, Andrew Harrison, Greg Macdonald, Ben Graham, Steven Thomson and Callum McCormack: Page 108 - Keir Skinner, Harry Colville, Callum McCormack, Steven Thomson and Josh Reilly: Page 112- Euan McIlvenny, Jonathan Barclay, Paddy Dolan, Steve Thomson, Craig Ogilvie: Page 114- Robbie Low and Ryan Shearer: Page 120 - Greg Macdonald, Ben Graham, Andrew Harrison, Steven Thomson, Callum McCormack and Harry Colville: Back Cover: Dan Hine.



The cartoons on pages 50, 75 and 98 were created by Warren Fyffe.

And its goodbye from them!
Glen Luibeg, Cairngorms. The evening sun casts a shadow on a heathery bank

-and finally

The author and his Expedition Course colleagues do not offer up this book with any thought that they are infallible.

But having done so many expeditions over so very many years, made lots of mistakes of our own, and seen the misfortunes of so many others, we're in a position to help you avoid getting it wrong all over again.

But however clever or skilled you think you are, there will come times when you will be grateful for sheer dumb luck! The great Karl Blödigg (and if you don't know who he was then it's time you found out) perhaps put it best when he said:-

*"I am made small and humble when I remember how often only a benign fate
and a benevolent mountain have returned me to life unharmed."*

Back Cover Picture:

A Cross- Scotland party going East in upper Glen Feshie on their way to *Glen Geldie*.
At this point they are just beyond half-way across Scotland. Montrose is still six days away.

