

# Contents

<b>SURVIVAL THERORY .....</b>	<b>1</b>
<b>RULE OF 3's .....</b>	<b>2</b>
<b>PLAN-M .....</b>	<b>2</b>
<b>PREPARE YOURSELF .....</b>	<b>3</b>
<b>ROUTE CARD .....</b>	<b>5</b>
<b>SURVIVAL TINS.....</b>	<b>5</b>
<b>WEATHER .....</b>	<b>7</b>
<b>PLAN- M - PROTECTION .....</b>	<b>10</b>
<b>SHELTER .....</b>	<b>15</b>
<b>FIRE.....</b>	<b>22</b>
<b>LOCATION .....</b>	<b>34</b>
<b>WATER AND FILTRATION.....</b>	<b>41</b>
<b>FOOD.....</b>	<b>51</b>
<b>NAVIGATION.....</b>	<b>59</b>
<b>SURVIVAL NOTES.....</b>	<b>72</b>

## **SURVIVAL THERORY**



The survival triangle is a great aid you can use to understand what it will take to mentally survive when you are faced with a real life and death situation. The triangle is broken down into three parts starting from the bottom working to the top in priority of importance.

The first part of the survival triangle we will talk about is by far the most important one, but it is also the hardest one to train for. Unless you have truly been in a situation where every one of your decisions could mean the difference between life and death you will not fully understand how powerful the WILL TO LIVE can be.

So let's talk about the will to live. This is the mental and physical attitude the survivalist will battle with throughout their entire situation. Certain things can be brought to light during a survival situation that could push the individual to keep going no matter what. The thought of leaving your family behind could be more than enough to push certain individuals to keep going and not give up. Working within a team could also help you push harder by not wanting to be the weak link and possibly putting others at risk. Each person is different; some will deal with a survival situation a lot better than others but you will never truly know how far you will go to survive in a real life threatening situation until it happens to you. You can train yourself to make your chance of surviving a lot higher by improving your KNOWLEDGE which is the next part of the triangle.

Knowledge is power as we all know; think about a time when you have had to stand out in front of people and talk about something you are really interested in. It is easy because you have a great understanding about what you are talking about and you become confident and it all seems to flow. This is the same with survival knowledge. It's all well and good sitting in your warm comfy house reading survival books but you will not become truly knowledgeable about the subject until you get out and physically do these techniques you have been reading about. You will find different ways of doing things that make it easy for you and that's what's important - what works for you. Go out and make mistakes NOW rather than waiting until you are actually in a dangerous situation to find out that the information you have been reading is not as reliable as you first thought.

Finally, the last part of the triangle is KIT and this refers to the kit that we carry when we go out on the hill, a walk in the woods etc. that is all specific to that particular task. We will all sit down when we are packing our bag for whatever adventure we are planning and go through loads of 'what if' questions. What if this happens, what if that happens and we keep adding stuff to our bags to cover every eventuality. When packing, you must always keep PLAN – M in mind and you will pack more effectively. Plan-M is an acronym of PROTECTION, LOCATION, ACQUISITION, NAVIGATION and MEDICAL and this is covered in more detail below.

## **RULE OF 3's**

**3 minutes** without oxygen

**3 hours** without shelter (in extreme circumstances)

**72 Hours** to be rescued

**3 days** without water

**3 weeks** without food

The main point of this rule is to help you understand that you must prioritise and concentrate on the most life threatening problem first. I am mainly referring to survival in an outdoor/ wilderness context, but a survival situation is a survival situation no matter what or when it occurs and these rules are still applicable. There is no point thinking about food if your main threat to your survival is hypothermia because your clothes are wet. Make no mistake; if you are shivering and cannot get dry and warm, you may not be able to function after **3 hours**.

## **PLAN-M**

**PLAN-M** is a guide to help you remember the priorities of survival, but as with the rule of 3's you have to adapt this guide to prioritise and focus on what is threatening your life at that exact point.

**PROTECTION** - means protection from the environment by employing your clothing correctly, finding or building shelter and lighting fire. Put yourself in this situation; you have crashed in Alaska and it is -12 degrees. What is going to be your first priority -building a shelter or lighting a fire to keep yourself warm? Lighting a fire first would keep you warm enough to be able to build a shelter. Prioritising is vital.

**LOCATION-** means being seen, being able to signal and ultimately be rescued

**ACQUISITION-** means getting hold of sustenance- water and food- as well as other resources.

**NAVIGATION-** by whatever means are available.

**MEDICAL-** treatment through use of first aid knowledge combined with available materials.

Using **PLAN-M** as a checklist of skills when preparing for travel to or through an environment, you can conclude that you are able to do the following;

- Understand the environment hazards and how to dress correctly.
- Light a fire
- Construct a shelter.
- Signal for help
- Find and purify water.
- Find food
- Make useful resources
- Navigate the terrain, by natural means as well as modern
- Perform first aid, both general and for specifics of the environment.

## **PREPARE YOURSELF**

So before we go into PLAN-M in detail I want to cover a few things we can do before we even leave our homes which could save our lives if the worst was to happen. In the military we use a little thing called the 7 P's which reminds us of the importance of always having a plan. The 7 p's stands for Prior, Preparation and Planning, Prevents, Piss, Poor, Performance. So I'm going to talk about a few things you can do before you go on any expeditions.

**Getting in to shape-** in any survival situation you are likely to be at your best, both physically and mentally, in the moments before the situation occurs. From that point on, through lack of sleep, food and water, your situation will deteriorate until your rescue. Being in a good physical condition will help you overcome the challenges you'll face in a survival situation. The benefits to exercising include strength gains, mental alertness and stamina - all great attributes to have in a survival situation.

**Emergency Plan of Action-** is exactly as it sounds. If the worst was to happen to you, someone could look at your EPA (emergency plan of action) and give the information to the rescue services which will massively decrease the search time for you. Below is an example of an EPA which would suffice.

EMERGENCY PLAN OF ACTION FORM		
<b>Full name as appears on passport:</b> Bob Stuart	<b>Date of birth:</b> 27/09/83	<b>Height:</b> 5,8 <b>Weight</b> 14 stone (93kg) <b>Hair colour:</b> Brown
<b>Passport number:</b> xxxxxx <b>Expires:</b> 12/03/16	<b>Driving licence number:</b> xxxxxxxx <b>Expires:</b> 16/4/16	
<b>Distinguishing marks</b> (scars,tattoos): Tribal tattoo left arm	<b>Languages spoken</b> English- native	
<b>Medication-</b> anti-malaria tablets <b>Allergies:</b> N/A	<b>Swimmer:</b> Strong swimmer <b>Outdoor skills/experience</b> Military experience working in all kinds of environments.	
<b>Next of Kin 1:</b> Mother Janet stuart 27 fog close Moray Iv30 9PO	<b>Next of kin 2:</b> Sister Lisa stuart 36 robert drive Moray IV30 8DS	
<b>Tel:</b> 07xxxxxxxxx	<b>Tel:</b> 07xxxxxxxxx	
<b>Trip details:</b> Campsite 1 – Grid 1234,5678 Campsite 2 – Grid 1234,5678 Vehicle; Landrover 1 – Black reg- ab1265 Group – Myself, Robert black Day 1- Park Landrover 1 at campsite 1 and walk to campsite 2 following route card on reverse side. Day 2- Leave campsite 2 and head back to landrover 1 following same route as day 1. <b>Foreseeable problems:</b> Day 1- None Day2- None		
<b>Communication plan:</b> Will phone my mum before we leave campsite 1 and will try phone her again half way through the route if I can get signal, If I can't I have told her not to worry. Will phone again when we reach campsite 2, should reach campsite 2 NLT 2100. I have phoned campsite 2 and they have told me that mobile service is strong on the site.		
My Mob- 07xxxxxxxx Robert-07xxxxxxxx Jan 16 Campsite 1- 01xxxxxxxx Campsite 2- 01 xxxxxxxx		Date 14

## ROUTE CARD

As mentioned above, a route card can also be made to go hand in hand with your EPA. A route card is a piece of paper usually laminated with all your grid references, bearings, back bearings, distances, timings and description of the route you are planning to take during your trip. You want to make at least two copies of this and leave one with a family member along with your EPA, as this will massively increase your chance of rescue if you do get into a spot of bother on your travels. See below for an example.

Leg	From Grid	To Grid	Grid bearing	Mag Bearing	Back Bearing	Distance	Timings
1	145770	146761	3090 mils	3176 mils	6376 mils	800m	12min
2	146761	140756	4050 mils	4126 mils	0926 mils	700m	16min
3	140756	148750	2400 mils	2476 mils	5676 mils	1000m	14min
4	148750	154739	2625 mils	2701 mils	5901 mils	1400m	10min
5	154739	172736	1760 mils	1836 mils	5036 mils	1750m	5min
6	172736	176726	2800 mils	2876 mils	6076 mils	1000m	8min
7	176736	177722	2880 mils	2956 mils	6156 mils	525m	25min
8	177722	176714	3355 mils	3436 mils	0236 mils	800m	6min
9	176714	170710	4150 mils	4226 mils	1026 mils	675m	18min
10	170710	167713	5450 mils	5526 mils	2326 mils	500m	7min
11	167713	147717	4950 mils	5026 mils	0826 mils	2300m	23min
12	147717	147724	0030 mils	0106 mils	3306 mils	900m	14min
13	147724	146732	6250 mils	6326 mils	3126 mils	800m	15min
14	146732	148750	0090 mils	0166 mils	3366 mils	1900m	13min
15	148750	140756	5550 mils	5626 mils	2426 mils	1000m	26min
16	140756	146761	0850 mils	0926 mils	4126 mils	700m	28min
17	146761	145770	6290 mils	6366 mils	3166 mils	800m	15min

You can also write a description of each leg to remind yourself of what you should see so that you don't have to constantly get your map out.

## SURVIVAL TINS

A survival tin is something else you can prepare in order to give yourself the best chance of survival if the worst was to happen. This tin enables you to put PLAN-M into action as soon as possible. Below is a list of ideas that can help you with the start of building your own survival tin.

- **Let's start with the tin itself.** You want to choose a tin with a waterproof seal and locking clasps or you can seal it with waterproof tape. It can be used as a signal mirror or to boil water and cook food.
- **Foil blanket-** Improvised tarp, hypothermia treatment, water collection and signal/location aid (tinsel tree)
- **Fishing Kit-** Acquisition of food, sewing wounds.
- **Cotton wool-** Fire when used in conjunction with ferrous rod and Vaseline to help it burn longer. Also can be used for packing wounds.

- **Pencil and paper**- Navigation (leaving bearings for people to follow) Medical observation, Tinder from wood/rubber and paper.
- **Condom**- water collection ( 2 litres) Tinder, medical wound dressing.
- **Small Knife and Sharpening Stone**- The best knife to use in a survival tin should be small and robust.
- **Candle**- Fire lighting, light, signal, tinder, food (if made from animal fat) repairing torn clothes.
- **Fire Block**- Fire lighting/signal
- **Chlorine tablets**- Water purification/ sterilisation
- **Potassium Permanganate**- Water purification/Fire lighting/signal
- **Whistle**- Location. In an emergency situation, blow 6 LONG blasts for over 1 minute.
- **Storm matches**- Fire
- **Razor blade (sterile)**- medical /game prep/protection
- **Button compass**- Navigation/location
- **Rubber/Rubber bands**- Long burning tinder- Fire/medical
- **Small First Aid Kit**- Medical/protection, Fire, should include Paracetamol/Ibuprofen, plasters and small bandages.
- **Heliograph**- Location, signalling Ground to air
- **IR Beacon** – Location, signalling Ground to air
- **Ferrous striker** – Essential for fire lighting
- **Wire saw**- Prep of fire wood, can be made into hand held saw by building a jig, Acquisition/Medical
- **Para cord**- Protection/Location/Acquisition/Medical
- **Wire**- Carry enough to make 8-10 snares, Protection/medical
- **Tea/Coffee**- Moral
- **Sewing Kit**- Medical, Repairing Clothes, Trapping
- **Suspender Buttons**- Suspending water filters, replacement larks feet for improvised shelter
- **Safety Pins**- Repairing clothes, Medical, Acquisition- Fish hooks
- **Money**- Location
- **Mini glow sticks**- Location
- **Photon Lights**- Location
- **Bits of Sponge**- Acquisition, Water- soak up hard to reach water
- **Surgical tubing** – Acquisition, Water- assist getting water in hard to reach places.

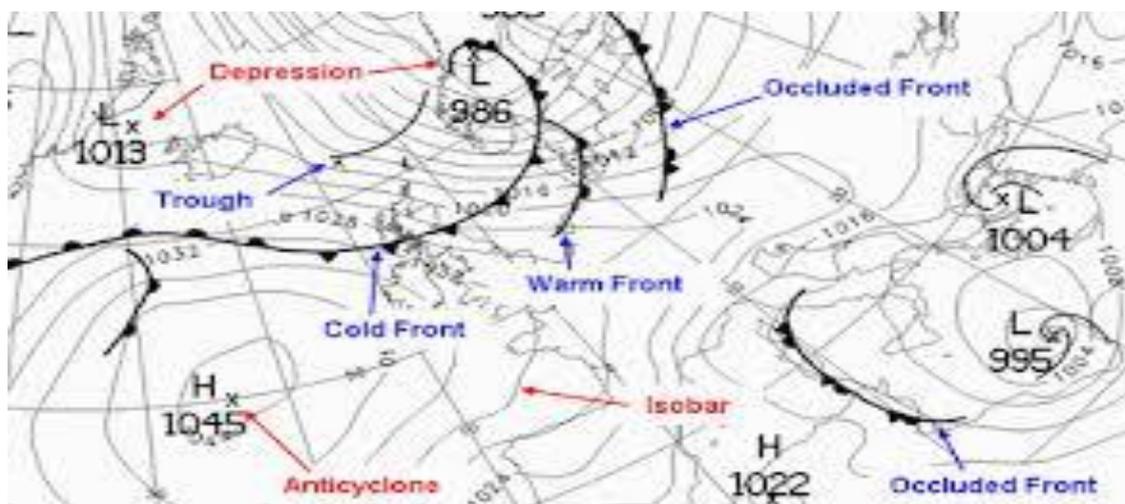
Most of the items above are multi use which is absolutely necessary in a survival situation.



## WEATHER

It is extremely important that you check the weather forecast for the area you are going to be covering on your trip. This will help you to pack all the correct kit for your trip, and also help for you to plan alternative routes if the weather was going to take a change for the worst.

The best websites to check mountain weather are [www.MWIS.org](http://www.MWIS.org) and [www.Metoffice.gov.uk](http://www.Metoffice.gov.uk). A good skill to acquire is the ability to read and understand synoptic charts. See below.



**Isobars** - are lines on a weather map joining together places of equal atmospheric pressure. On the map the isobar marked 1022 represents an area of high pressure, while the isobar marked 995 represents an area of low pressure. In areas of high pressure we would expect to observe fairly clear skies. In areas of low pressure the air condenses to form clouds, and skies are usually overcast.

**Cold fronts** - are usually associated with depressions. A cold front is the transition zone where a cold air mass is replacing the warmer air mass. The cold air is following the warm air and gradually moves underneath the warmer air. When the warm air is pushed upwards it will rain heavily. More rain will often fall in the few minutes the cold front passes than it will during the whole passage of a warm front. As the cold front passes, the clouds roll by and the air temperature is cooler.

Cold fronts are shown on synoptic charts by a solid line with triangles along the front pointing towards the warmer air and in the direction of movement. On coloured weather maps, a cold front is drawn with a solid blue line with blue triangles.

**Warm fronts**- are formed when warm air rises over a mass of cold air. As the air lifts into regions of lower pressure, it expands, cools and condenses the water vapour as wide, flat sheets of cloud.

Warm fronts are shown on synoptic charts by a solid line with semicircles pointing towards the colder air and in the direction of movement. On coloured weather maps, a warm front is drawn with a solid red line with red semicircles.

**Occluded fronts** - occur at the point where a cold front takes over a warm front or the other way around. If a cold front undercuts a warm front it is known as a cold occlusion and if the cold front rises over the warm front it is called a warm occlusion. Occluded fronts bring changeable weather conditions.

On a synoptic chart, occluded fronts are represented by semicircles and triangles positioned next to each other. The triangles are in blue and the semicircles are in red, or both are purple (mixing both red and blue colours together).

**Depressions**- are areas of low atmospheric pressure which produce cloudy, rainy and windy weather. These low-pressure systems often begin in the Atlantic, moving eastwards towards the UK. They are responsible for the UK's changeable weather.

**Anticyclones** - are the opposite of depressions - they are an area of high atmospheric pressure where the air is sinking.

**Trough-** A trough on a weather map is an elongated area of relatively low pressure. Troughs bring cloudy and rainy weather and are represented by a hash mark.

## CLOUDS

Clouds can also help you to read approaching weather, there are three types of clouds, high clouds, medium clouds and low clouds and within these three groups are different make ups of cloud which we will cover briefly talk about.

**High clouds-** Fair weather clouds are white and high in the sky. Blankets of high cloud can mean bad weather is coming.

High clouds include;

**Cumulonimbus-** is associated with thunderstorms and heavy rain.

**Cirrus-** is made from ice crystals as the cloud forms at temperatures well below freezing.



Cumulonimbus



Cirrus

**Medium clouds-** Thick layers of medium-layer clouds give heavy persistent rain, especially if the clouds are dark and grey.

This includes;

**Alto cumulus-** they signify fairly deep instability.

**Nimbostratus-** can cause moderate to heavy persistent rain.

**Altostratus-** usually indicates the approach of a warm front.



Alto cumulus



Altostratus



Nimbostratus

**Low clouds-** low clouds can indicate whether rain will fall in short down pours or persistently.

**Stratus-** dense grey cloud that covers the sky in a sheet, rain can fall continuously and for long periods of time.

**Stratocumulus-** covers the sky in an irregular sheet that can be either grey or white in colour. These can lead to drizzle or snow.

**Cumulus-** often develops on bright sunny days in slightly unstable air masses. As long as these billowing, puffy clouds keep their form, they- along with blue sky- indicate fine weather.



Stratus



Stratocumulus



Cumulus

Never underestimate the weather and ensure that you make it a priority that you check the forecast before you leave for your trip.

## PLAN- M - PROTECTION

So now we have covered a list of planning considerations you can think about before you leave your house. We are going to move onto explaining PLAN-M in detail starting with PROTECTION.

So our first line of Protection in the outdoors is our clothing and there is certain ways you can put on your clothing to get the best out of them and it is known as the layering system. The layering system is made up of three layers starting with the base layer, moving onto the mid layer and finishing it off with the outer shell. We will break down each layer and talk about what they do and what are some of the best materials on the market.

The first layer in the system is the base layer and it is the closest to your skin, so it collects all your sweat. The purpose of this layer is to keep you dry by pulling moisture away from your skin and spreading it throughout the fabric. At the same time this fabric should fit tight and retain some insulation properties. Never wear cotton as a base layer, which does wick moisture away, however it then retains that moisture as the cotton loses its resiliency, loses its warmth,

and causes too much evaporative cooling. There are two main categories of base layers: synthetic and wool. Examples of synthetic layers are polypropylene and polyester the benefits of which are that they are not itchy, tend to be less expensive than wool, are more durable, and fast drying. The downside to the synthetic base layers is that they tend to hold odour.

People base their choice of material on a number of reasons, for example many feel that wool insulates better than synthetics and stays comfortable throughout different types of climates. Wool takes longer to dry than synthetics but they do continue to insulate well even whilst wet. Today most wool base layers are made from merino wool which is a lot thinner and lighter than normal wool and also less itchy. A down side to wool base layers is that they seem to get damaged a lot easier than synthetics so if you are a rock climber you are probably best with a synthetic base layer. Walkers on the other hand are better using merino wool.

Base layers come in different thicknesses depending on your chosen activity, so if you are a mountaineer you would be better off with a thinner one due to the strenuous activities you will be carrying out throughout the day.

The next part of the layering system is the mid layer and its primary purpose is to insulate. This part of the system can be doubled up if the weather is extremely miserable. A midlayer's job is to trap as much of the body heat as possible.

Four of the most common types of midlayer are fleece, pile and pertex smocks, insulated synthetic jackets and down jackets. We will cover the pros and cons of each.

**FLEECES-** fleece is the name given to a range of materials made from synthetic fibres which are commonly used for insulation clothing. Fleece tends to be lighter than wool for the same level of insulation. It also retains much of its insulation properties when wet, since it's hydrophobic (meaning that it only holds a small amount of water) it will dry more rapidly too. There are warmer insulation layers than fleece; some fleeces can be rather hard to pack down small, if you are looking to save space in your pack. But if you are looking to save money fleece is a good bet.

**PILE + PERTEX-** pull over tops that are furry on the inside with a nylon shell on the outside. Pile or fibre pile works in a similar way to animal fur. It provides insulation against the cold and knits tightly together to retain that insulation when wet. Being made of many small strands allows the pile to dry quickly too and feel less chilly against your skin as the tips dry first. These smocks also have a shell made of pertex or a similar nylon material that makes them tougher and offers some wind resistance. Some pros are that this type of material is really tough and can be treated rough and still work at its best for you. They

also have an advantage over synthetic and down jackets and that is that they have pile which means they wick sweat and breath much more effectively than the down and synthetics. The main down side to these are that they tend to be much bigger and heavier than the down and synthetic jackets.

**SYNTHETIC INSULATION JACKETS-** are similar to down jackets except that they use a synthetic filling rather than animal feathers and down. They're much the same as synthetic sleeping bags. They tend to have shells made of thin nylon or pertex which gives them a shiny, plastic look. They are filled with synthetic microfiber which mimics the lofting properties of down while staying water resistant. The most common brand of this microfiber filling is primaloft. These jackets do offer a really good level of warmth for very low weights from 200g or less and without the fragility and fear of water that you get with down. They also tend to be cheaper. However, if you are going somewhere dry then a down jacket will give you better warmth for its weight.

**DOWN JACKETS-** Down is a type of very thin feather which has strong insulation properties. It is particularly useful in outdoor clothing because of its excellent warmth to weight ratio. Down jackets are much like a down duvets, down pillows and down sleeping bags. The quality of a down jacket can be assessed on three metrics

**1-** down to feather ration- fluffy white down is warmer than actual feathers of an animal but more expensive. As such, a cheaper down jacket might only contain 80% down, with the remaining 20% being feathers, whereas a more expensive one might contain 95% down.

**2-** Fill Power(loft): fill power is a technical measurement for a down's loft that is how much space a given weight of it fills. The more space it fills the warmer it will be. A cheaper jacket might have a fill power of 500 and a top quality one might be 800+

**3-** Animal pedigree- Different birds from different parts of the world are variously heralded as having the best down. Canadian goose down is a popular choice, for example.

Down provides better insulation for a given size and weight than any other material, natural or manmade. The problem with down jackets is that they are expensive, often a bit fragile and are highly susceptible to water. When down gets wet it clumps together and its insulation properties plummet. Of course any clothing that gets wet is not going to insulate you as well but this starts to happen even when down gets just a little damp and the effects can be permanent. It is a delicate process to dry down out without ruining it and while it is possible to get down jackets with waterproof shells, this feature makes them bigger and heavier and you can still get moisture inside which then becomes even more difficult to dry properly.

The last part of the layering system is the outer shell; this layer is there to keep you dry from any sudden downpours of rain. These jackets can carry quite a heavy price tag so when buying one you want to make sure that you are getting the right one for the activity you are going to be undertaken. For example, if you were a climber you would want a jacket that has plenty of mobility, for skiing you might prioritise breathability. As the number of outdoor enthusiasts has increased over the years there has been a growth of outdoor clothing business, bringing with it different kinds of water proof fabrics thus it can be rather confusing to get your head around what each one does. We will cover a few including GORTEX Pro, GORTEX Active, eVent and Dry.Q.

Most hardshell jackets you buy from the shop will come with a DWR coating (Durable Water Resistant). This coating is what allows the water to ball upon the jacket and run straight off. However it is only a coating and with time and wear on the product it will come off yet there are products you can buy to reapply this coating.

GORTEX make four primary waterproof breathable membranes that are designed for specific end use: The GORTEX Pro is the company's best product as it offers a 35% increase in breathability over other brands of GORTEX. It also offers the company's best abrasion-resistance –to-weight ratio. It is also the most expensive membrane you can buy.

GORTEX Active is the newest and lightest membrane. It is not for use under certain circumstances such as being worn under a 70lb pack. It is designed for short duration trips like a day trip in the Alps.

eVent, GORTEX's largest competitor, works using a system that they call Direct Venting. The eVent membrane allows air to flow directly through it, allowing for direct evaporation of sweat liquid. EVent also claims that their products are windproof however with the air flow membrane it is not going to be as wind proof as GORTEX.

Dry.Q Elite is a make from mountain hardwear in an attempt to separate themselves from GORTEX. Their fabrics are made from the same people that make eVent. There are several different versions, with Dry Q elite representing the top of the line.

Okay so we have covered the layering systems. I am going to cover layering in different seasons, so you have a basic level of knowledge to be able to dress effectively and appropriately for all types of weathers.

**Summer Half- Day Activity** - for a half day hike in the summer or short multipitch rock climbs, you will only require a two layer system. It's going to be warm and you aren't going to be too far away from civilization therefore there is no need to overdo it with a insulation layer. But always check the weather before you start to pack your clothing system, it is good practice to always carry

a water proof layer just in case the weather does decide to change. So a base layer and an outer layer will be more than enough for a nice summer's day.

**Summer Full- Day Activity** – A full day in the hills can bring with it different weather that can appear out of nowhere so a three layer system would cover you for most circumstances. It is good to pack a base layer, mid layer such as a fleece etc and either a soft shell or hardshell jacket.

**Multi-day activities** - There is not a huge difference between the full day and the multiday layering system. I would consider taking a spare base layer and getting rid of the fleece and changing it for a synthetic down so I have a bit more warmth in the evenings. I would defiantly be packing full water proofs with me as well.

**Winter Wandering** - For colder and wetter activities, such as skiing and ice climbing, a 4 layer system will work best allowing you to cool off during the periods you are working hard and to keep yourself warm during the stormy parts of your trip. So you are looking to wear a base layer, mid layer, insulation layer and have your full water proof gear with you as well.

As with all the systems mentioned above you can apply the layering system to your legs as well as your upper body and always carry water proof hat and gloves with you at all times. Furthermore, to be extra safe, you can carry a spare set in the bottom of your bag with your emergency kit.

There are 4 main ways in which our bodies can lose heat in the mountains;

**Evaporation**- so if you are wet from sweat or precipitation, the process of evaporation cools you down. Evaporation is the primary cooling function of your body sweating in the first place, but in a cold environment this can be dangerous because it can cool you off too much and put you in a situation where you can't get warm again. We all have the common sense to wear waterproof clothing if it's raining to keep us dry but what some people tend to forget is how dangerous their own sweat can be. If someone for example goes out for a hike in a cotton t-shirt, that t-shirt is going to get soaked in sweat and it has not got the correct properties in the fabric to dry itself out. If the wind picks up it could start to create a possible dangerous situation for you. It is the cooling power of evaporation that motivates layering systems to wick moisture away from your body and breath, allowing you to stay cool and relatively dry.

**Radiation**- Your body gives off heat. If too much escapes to a cold environment, it is harder to keep your core temperature up. So keep your whole body covered up in a mountain environment to lower the risk of you losing heat to the elements.

**Conduction**- Your body loses heat by touching something colder than it is. This is the reason we use roll mats when camping. They keep our body warmth near our bodies and don't let the heat soak into the cold ground. Conduction also

comes into play in a cold rain, sleet or snow storm. Each rain drop that lands on your skin will suck away body heat.

**Convection-** We have all heard of the wind chill factor, where the effective temperature is much colder due to wind. The reason wind chill can be so deadly is that it combines the worst of evaporation with convection, leaving you with a double dose of cold. Convection is the cooling from the movement of air and fluids. Convection works like this: cold air or water moves near your body, heats up and moves away, allowing more cold air or water to reach your body again, cooling you off. Bottom line is that nothing will so rapidly throw you down the path to hypothermia as wind's one-two punch of evaporation and convection.

## SHELTER

The next part of protection we are going to talk about is shelter, so if we think back to the rule of three's we would have 3 hours to get ourselves out of the



elements and into shelter in an extreme situation. So what kind of shelter you build will depend on a few things; what resources you have to hand, what resources are in your immediate area and how many people are going to be using this shelter. The materials you will have to hand will come from 3 sources; the vehicle, aircraft or natural materials depending on your situation. Shelters can also be

made by using natural features like fallen trees, rock over hangs, hollows and caves. These kinds of shelters will massively cut down the work load that you would have to do if you had to start from scratch. Survival is all about doing as less as you can and saving your energy for when it really matters. You can back all these natural shelters up with whatever materials you have to hand as well, to make them as comfortable as possible.

Some considerations to take into account before you build your shelter;

*The time of day you are building your shelter*, is it going to get dark soon? Are you going to have to rush and possibly make a bad decision in the hurry? Is it better to get a temporary shelter until morning when you can choose a good site and not have to rush?

*The weather*. What direction is the prevailing winds coming from (south west)? Is your shelter going to make the most of the sunlight? Taking into consideration the sun rises in the East and sets in the West and is in the South during midday. Avoid valleys as they can expose you to cold temperatures during the night and stay away from possible flooding risks or soggy ground.

Are you near a water supply? Are there plenty of materials for you to use, not only for your shelter, but also for your fire.

*Insects* are there a lot of midges where you are?

*The terrain.* Are you situated under a cliff where rocks could be dislodged in bad weather? Are there a lot of branches above you that could break off in strong winds and possibly land on you?

Good awareness of the surrounding environment is vital in a survival situation.

**Shelter types-** there are a few shelters you can make with natural materials and shelters you can make from items you would usually carry with you on a day hike etc. we will cover a few ideas now but these are only a few the different types of shelters you can build is only limited materials available and you're imagination. When building your shelter it should be big enough for whoever is going to be living in it but not too big that it is going to take you hours to build. Furthermore, if you make it too big it will be very hard to keep the shelter warm when you come to light your fire. A lot of people carry tarps with them in their bags when they go outdoors which is a valuable bit of kit as you can make a number of shelters with it and it can also be used for things such as water collection, improving natural shelters, location, the list goes on. As seen in the pictures below there are a number of ways to turn your tarp into a mobile home;



If you are on a mountain and there is a lack of trees or materials to erect a tarp or build a shelter, you can carry a couple of items that are reasonably small and take up next to no room in your kit which could possibly save a life. The first one we will talk about is the bothy bag. Bothy bags are indispensable lightweight emergency shelters which allow the users to create a 'microclimate' that is warm and dry - perfect for map reading, group discussions or even as a morale-booster for wet lunch breaks. See pictures below.



The next one is the same kind of idea as the bothy bag but it is an individual shelter and they are called survival bags. See pictures below.



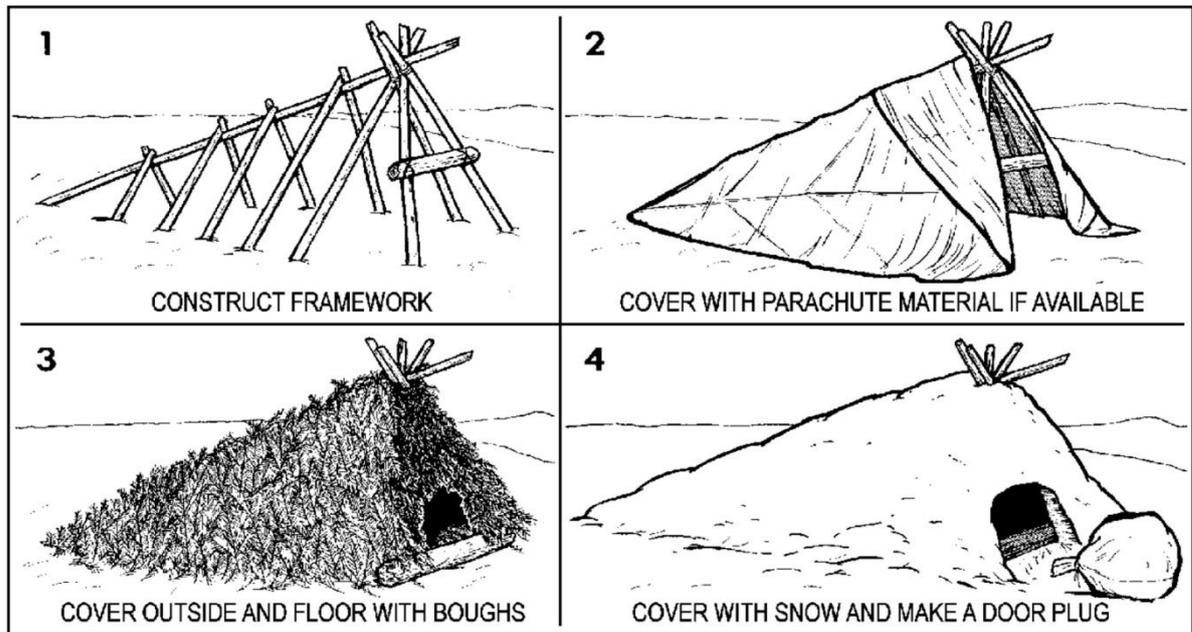
We will now have a look at survival shelters. There are two main type of shelters that you will build in a survival situation and they are the thermal A-frame shelter and the lean to. We will cover both now.

The thermal A- frame (see Figure VI-5) would be the shelter of choice for the lone survivor or possibly two. It can be put together in less than an hour and takes minimum effort to make, you will need three sticks for the frame 2 x1.5m and 1 main pole about 3m. You can either lash the three poles together with cord or if the two support sticks have V shaped ends the main pole can be held in place by the. Try and not have the frame any higher than the waist.



Once the frame is standing you can start to build a base for insulating your shelter by laying down sticks on top of it. You then use moss to insulate the roof as well as leaves or any kind of debris you can source. Once you have insulated the roof with your moss start to lay pine or spruce boughs down the shelter insuring that the

needles are pointing down off the shelter. This ensures that, in the event of rain, the water will run off the shelters roof and not just bunch up to form a puddle that will eventually soak through the shelter. You can use bark from trees as tiles to water proof your shelter if you have a lot of bark available around you. Ferns also work just as well as the spruce and pine boughs for ensuring the rain runs off your shelter. Once the frame is built it is time to make your bed. Think back to one of the reasons why our bodies lose heat..... CONDUCTION. We want to be as far off the ground as possible to avoid the cold ground conducting our body heat away from us. So you will have to back a lot of moss into your shelter. You will be looking to fill it half way to the top

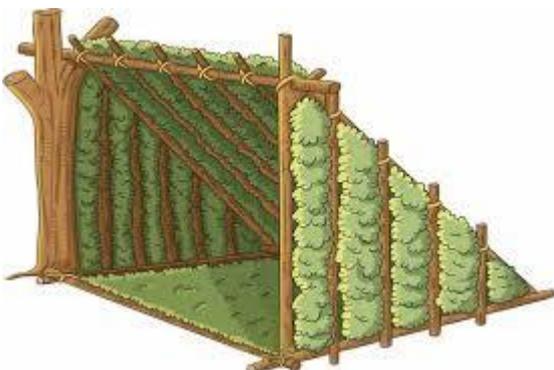


**Figure VI-5. Thermal A Frame**

because when you lay on it will all flatten to the floor. You can make yourself a bed from logs to give you that extra few inches of the ground if you have the resources readily available. The picture below shows you different variation of how you could insulate your thermal A frame depending on season and resources available;



The next shelter we will talk about is the lean to shelter. This shelter takes longer to build than the thermal A frame but is more comfortable and a lot more practical for groups of people. It requires more material but if you have 4 to 5 people helping to build one it can be made in no time at all. So first thing you want to look for is two trees close together, around the same distance as you standing with your arms fully stretched out. You can use them for your supports. For your cross bar make sure that it leans into the vertical supports and not in front of them and also that it isn't higher than waist height. You can either lash the cross bar to the tree if you have plenty of cordage, if not then you can find two support sticks with V shaped ends to hold your cross bar in place. Once you have secured your cross bar to the trees you need to start laying more struts of wood off the cross bar to make the roof but before you do this, get the tallest person in the group to lie down to gauge how big the shelter is going to have to be. Once you have completed the roof ensure the triangular sides get closed up as well. Then, following the same principle as the thermal A frame, you start to insulate the roof and also the ground for your bed. You can add extra parts to your lean to, for example you can bring the front down even further by getting two V end sticks to hold another cross bar in place to the front of the shelter. This will make it more sheltered and therefore better for gathering all the heat from your fire. See diagrams below.



These are your basic shelters that can be made with relative ease and as always with survival it's down to the amount of materials you have got and your imagination to be able come up with various types of effective shelters. It is best to go out and practice in a safe environment rather than waiting until it is too late. I am now going to briefly touch on one other shelter which can be made in a winter environment.



The winter shelter we will talk about is the snow hole. The best place to construct this shelter would be in a steep snow bank. Doing this will mean you have less to dig before being able to dig upwards to form your living area. The biggest problem when building a snow hole is that large slopes covered in lots of snow tend to be the best areas to build them and they have the potential to form avalanches. If you are not 100% sure you should carry out a squeeze test to determine the state of the underlying snow. To do this you make a snow ball in your hand, if the snow falls apart when you open your hand up, this is a sign that the temperature on the surface is below freezing. However, if you can easily make a snow ball, the temperature is probably just above freezing and if you can make water come out by squeezing it then the temperature is relatively high. Snow below freezing may be unconsolidated and could lead to a powder

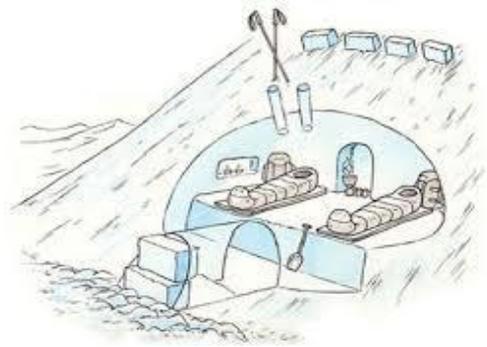
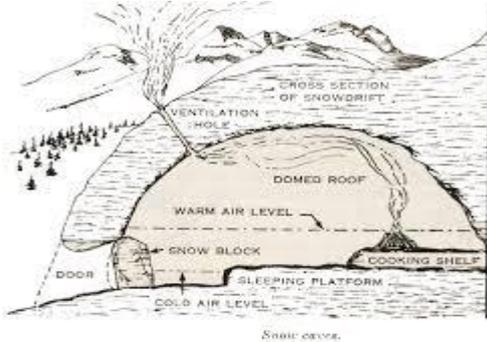


avalanche risk if there is sufficient build up. There are a few more ways to check for avalanche prone snow and I would highly recommend you get familiar with them if you are planning to go out and practice making these shelters. When you are digging your snow hole it will be very

damp work and it is good practice to wear full waterproofs and a thin layer inside to avoid getting too sweaty which could lead to hypothermia. Always carry a spare pair of gloves with you as well, as the ones you will be wearing to dig the snow hole will get soaked. The use of a snow shovel is highly recommended as the task will take you sufficiently longer without it. You also want to test the depth of the snow to make sure that it is deep enough and that you're not going to hit a boulder field after digging down about a metre. Furthermore, a snow saw could be useful if you reach some difficult layers and it can be massively helpful to construct blocks of snow. There are a number of ways to dig a snow hole however I will briefly discuss one the method which requires a partner. The first thing you're going to do is dig out the door ways, so mark out the shape on the slope and have it approximately 48 inches high and the width of your shoulders. You and your partner can start digging inwards and slightly up. How far you go before starting to enlarge the hole depends on the angle of the slope into which you are digging. Once you have dug in as far as you need, the sleeping area can start to be dug out by digging upwards and sideways. You want to make this area big enough for you and your partner to comfortably move around. The floor of the sleeping area needs to be higher than the entrance, as this will serve to keep warm air trapped in the living area, allowing the cold air to run out the door. At some point you and your partner will join up sections and this will provide more room for digging making the process go faster. You can put a bivy bag down on the floor to collect the snow being dug out by you and your partner and every now and then one of you can pull it out the entrance to empty it. The living area, when finished, should be of a dome shape with plenty of room for you both. Ensure the roof and walls are all smoothed down as this will stop dripping when the snow hole begins to warm up with your body heat and your cooker. You may want to block off the entrance slightly however make sure you don't completely block yourself in and leave enough space for not only oxygen to circulate freely through the shelter but also to ensure that all the gas from your cooker can leave the snow hole. Candles are a good source of light in a snow hole but again ensure that adequate ventilation is obtained all through the night. If you do decide to go out the snow hole during the night, for example if nature calls, it may well be worth

tying yourself to a rope and leaving one end with your partner as it can be rather difficult to locate a snow hole if the weather isn't so pleasant outside.

There are a number of shelters that can be made in the snow and I urge you to go out and practice different techniques. Winter is a completely different ball game to summer training so please ensure that you go out prepared and check the weather and the avalanche reports.



## FIRE



The last line of protection we are going to talk about is fire. Fire is a key element in survival it is used for many things like warmth, signalling, light, drying clothes, making tools, water disinfection and cooking. The fire will also keep away animals and insects. It is best to build your fire small as it will take less effort to keep it burning. The three essentials that will get your fire lit are oxygen, fuel and heat and if any of the three mentioned there are not incorporated in the fire it will not light. The 7 P's come into play massively when fire is concerned and they are Prior Preparation and Planning Prevents Piss Poor Performance. It is important to take the time and gather all the right materials for starting your fire and collect enough to ensure that your fire will



have a good chance of sustaining itself. As a rule of thumb you want to collect 3 times as much tinder and kindling that will be necessary for lighting one fire.

Fire lighting materials fall into three categories and these are Tinder, Kindling and Fuel.

With regards to the size of materials you use, remember to start with pencil thickness, move to finger thickness and then to thumb and carry on in a suitable manner until the fire is established.

The first material we will talk about is Tinder there are two types of tinder and they are manmade and natural. With tinder you are looking for something with a low combustibility level that will take a spark or a flame easily. You want it to be fibrous and fluffy in texture so there is more surface area for the spark or flame to take to it. We will cover a few man made tinder first;

- Cotton wool. If you want to prolong the burning rate of the cotton wool you can add Vaseline, deet, lip salve, hand sanitizer and bees wax to it and many more things to enhance the burning life.
- Dryer lint. Ensure if you are using dryer lint that the lint is made up from cotton and not synthetic material as synthetic materials melt rather than burn.
- Paper towels. Again sprayed with deet will prolong the burning affect.
- Rubber. Bike tyre inner tubes cut down to small squares hold a flame very well.
- Cotton mop heads cut down.
- Alcohol wipes.
- Jute twine, can be bought from a post office.
- Steel wool and a 9v battery. Make sure you get super fine wire wool, you need at least 3 volts for this to work.
- Char cloth is cotton material put it into a cooking vessel and heat it up until it is starved of all oxygen.
- Tampons
- Wetfire is designed to light when wet and even when on water.



That is just a selection of manmade tinder to get you started. We will now cover Natural tinder sources.

- Western red cedar tree can be used to make a tinder nest by pulling the bark from the tree and scraping it to produce loads of fibres that will easily take a spark.



- Birch bark is a brilliant natural tinder source it is full of natural flammable oils that light even when wet they require some processing to be able to take a spark straight away. You can collect sheets of birch bark and process them down into small strips and wrap that strips around your finger to create curls which will make the birch more acceptable to a spark. You can also scrape the face of the birch bark with your knife to create birch bark dust that will take a spark as well.



- Coal fungus can be found on dead tree stumps and they resemble lumps of charcoal, hence the name. They do not combust into flames but they can hold an ember for a very long time and can be transferred across to a tinder bundle to combust that into flames. To process the fungus, cut it in half and you will see rings inside of it. Each ring represents a new season of growth. Once cut in half, place on a flat surface and scrape your ferro rod into its core. It will eventually pick up a spark, as soon as it does blow on it to spread the ember until it is big enough to transfer across to the tinder bundle.



- Pine cones can be used but they have to be processed first by crushing them up in your hand to create pine cone dust ensuring you remove the bigger lumps before you attempt to introduce a spark. When you start to scrape your ferro rod onto the pile be patient and persistent as it sometimes takes a little while for it to ignite. Even when it does ignite it is a very small weak flame. Whilst we are on the subject of pine, the pine tree also produces pine resin that can be used as a enhancer when lighting your fire. It will not take a spark straight from your ferro rod but it will enhance your flame from the pine cone dust if added gently.



- Tinder fungus (horse shoe fungus) can be found growing out of dead or alive birch, beech and the bases of oak trees. The fungus is in the shape of a horse shoe and the part you want to process from it is the soft spongy amudu top layer. When you process it down it should be spongey and bounce back when squeezed and it should also feel like felt when you run your finger across the top. If it reaches all these characteristics you have the right stuff. Again with the tinder fungus it will not combust when you introduce your ferro rod, it will catch a spark and smoulder. Blow the ember until it is big enough to add to a tinder bundle and blow the bundle into flames.



- Rose bay willow herd through late summer and autumn time will produce a seed that is fluffy and cotton like. If enough is collected it can be used as a tinder because of the texture of the material it is known as a flash tinder so it will take a spark very well but the flame will burn out very quickly. You can enhance the flame with things like pine resin etc to get a long enough flame to introduce your kindling.



- Thistles seed from as early as late spring and the unopen buds of these prickly thistles can be used to expose their fluffy inners which can be used as a good tinder source.



- Punk wood is found along the forest floor and in standing dead wood. When collecting punk wood, try and opt for the ones that are off the ground as they do not have collect as much moisture as the ones on the ground. Punk wood will not combust into flames but will catch an ember and can be blown into flames by adding to a tinder bundle. You can also char punk wood in the same way as you would char clothe to make it more likely to spark.



- Wood shavings can be used as well. If your knife is sharp enough you can process twigs down to small piles of shavings. A good tip is to carry a pencil sharpener in your survival tin as this can be used to shave down small sticks. The small wood shavings do take a lot longer than some of the tinder mentioned above so be patient.



- Dry grass can be used as a tinder bundle, but it can also catch a spark if you are persistent. It will take a lot out of your ferro rod but if you keep a constant shower of sparks on the grass it will eventually take a spark and combust into flames.



So we have covered the two types of tinder you can use to get enough heat to combust your kindling into flames, but we still need some sort of ignition source to produce enough heat to combust our tinder into flames.

We will now cover different types of ignition sources you can use to help with starting your fire.

- Matches and lighters would be the obvious choice to start your fire and as a rule of thumb you should always carry one or the other on you if you plan on venturing out into the wilderness. There are many types of lighters you can get from your local shop but it might be worth spending a little bit more money and get either a zippo or a wind proof lighter as these will last longer than your bog standard lighter. Just remember that lighters have working parts that can easily break so it's good to carry more than one with you. Matches are a good back up for your lighter and again like the lighter there are many to choose from. You want to buy wind and water proof matches. You can get them for as little as £2 from the internet and they will give you the best chance of getting your tinder light even on the worst kind of day. The water/wind proof matches have a extended head so you have more time to use it when it is lit, which is always



useful. Make sure with both the lighters and the matches that you still water proof them in your bag to give yourself the best shot of getting your fire going when it comes to use them.

- Ferrocerium rods are pyrophoric alloys of iron with cerium; used for lighter flints. It is capable of igniting spontaneously in air with the use of friction. The ferrocerium rod is a very clever invention and is extremely easy to use; it is also very cheap and lasts for a very long time if used correctly. Again there are many types out there, I personally prefer the longer ones as I can shower a lot more sparks down onto my tinder with one strike. It is all personal preference so try a few and see what one you like best.
- Magnesium blocks can be bought and scraped down to fine shavings to add to your tinder bundle. Magnesium burns hot enough to separate water molecules so it will definitely be a useful product to add to your fire lighting kit. It also comes in a powder form which is brilliant for just adding a sprinkle to your tinder bundle to make sure that it will definitely ignite.





- Magnifying glasses can be used to direct the sunlight onto dry tinder's. This method has the problem of needing the sun which is something we don't get much of in Scotland. It works best with pieces of char cloth because they do not take much to start an ember on. If you don't carry a magnifying glass with you (which a lot of us don't) you can use the magnifying glass on your compass, or you can polish the bottom of coke can and use that as well. These methods are just good to know as it gives you more knowledge and its true what they say - filling your head with knowledge will lighten your day sack. If you were desperate for an ignition source you can fill up a condom with water and try to reflect the light through that to hopefully get an ember in your char cloth. Go out and try it and see how it works for you. You can also use a parabolic reflector which is a big mirror that concentrates the suns light directly onto the centre piece where your char cloth can sit or any easily combustible material.



- 9 V battery and wire wool works as a good ignition source because when you touch the wire wool onto the battery it connects the positive and negative charge to give sparks which alight the wire wool. This will only work if the battery is over 3 volts and works best with a 9 V battery. If, however, you only have two double AA batteries, you can hold them together with duct tape ensuring that the positive and negative ends are shown and attach a piece of wire wool to either end to complete the circuit. Ensure when you are buying the wire wool that it is the extra fine brand you get as it will work best. If you have the wire wool but do not have the battery you can shower the wool in sparks from your ferro rod which will ignite the wool just the same.



- Potassium Permanganate mixed with glycerine or antifreeze 50/50, will result in a chemical reaction which causes the mixture to combust into flames. You can buy potassium permanganate and glycerine from the internet. It is a good ignition source to keep in your survival tin. Potassium permanganate can be used for purifying water, creating an antiseptic solution, antifungal treatment for hands and feet and marking snow as an emergency signal.



- Piston works with ignition by rapid compression using a thermodynamic device. Similar to a diesel engine, the fire piston creates sparks by rapid compression of a gas. They work best with char cloth prodded on the end, as char cloth catches an ember easily.



We will talk about different types of fire you can make if you have the luxury of time on your side there are many types of fires you can construct for a wide arrange of tasks but you have got to think, what is my immediate need for the

fire? Is it for warmth? Do I need to dry my clothes? The type of fire you make will solely depend on your needs.

- Tepee fires are quick to get going due to the wood being raised and steep as fire loves to travel up. Once the fire is established you can start to add wet wood to the outside of the tepee so the inner fire will dry it out. The tepee is best used for warmth, cooking and signalling if green vegetation is added, but it can be used for a lot more if need be.



- Long fires can be used to line the whole length of a lean to shelter and they are very long lasting and if established well can last all night. They are best used for warmth and cooking once embers have formed.



- Star Shaped fires are good long lasting fires and produce good embers for cooking.



We have talked about types of tinder you can use for starting your fire; we will now touch on the best kindling and the best fuel to use to make sure you get the best chance of getting a good fire going. So kindling is the second material

added to your fire to generate enough heat to eventually burn your fuel. Kindling wants to start off as thin as a match stick working up to the thickness of your thumb. When you collect your kindling it should snap off with a cracking sound which will indicate that it is dry on the inside. If it is damp remove the outer bark as this will retain most of the moisture. Break the kindling down into small sticks about 6 inches long. Types of kindling to use are soft- wood twigs from the end of living trees or standing dead wood works well. Try to avoid picking wood up from on the floor as it will be saturated with moisture. Wood with flammable resin such as pine will work well. You can use certain types of tinder as kindling but it will have to be in larger amounts for example pine cones, bark, pine needles, dry grass and ferns.

The final stage of wood you want to be putting on to your fire is the fuel. At the early stages of your fire you are going to be tending to it constantly to ensure it stays alight. Once the fire can maintain itself for 5 minutes you can start adding your fuel. There are two types of wood to use and they are hardwoods and softwoods. Hard wood are trees such as oak, maple, ash, beech, rowan and birch. These fuels burn for a long time and burn very hot and create a good coal base for your fire, but they are harder to light than softwood. Softwoods are trees such as pine, spruce and firs, these woods burns faster than the hard wood due to their high resin content but do not let off as much heat. With your fuel you want to be starting with your thinnest type working up to the thickest. You can start to add living green wood and larger logs to the fire once it is completely established.

We will cover a few techniques to help establish a fire even in poor weather conditions. Fire lighting might not present a problem for most people when it is nice, dry and warm outside but when you start to add wind and rain to the equation it could start to go downhill very fast. So the first thing you're going to want to do is find a way of protecting your fire from the element. The best way to do that is build a small lean to shelter for your fire to be constructed under. Once you have constructed your fire shelter you are going to want to find some dry logs to lay on the floor to raise your fire away from the damp floor, as the damp ground will conduct all the heat from your fire and make lighting your fire a lot harder. You then want to start thinking about finding some dry materials. Look for any fallen trees that have been protected from the rain and search that area for anything dry such as grass, dead leaves, pine cones and funguses. Remember birch bark is also very good tinder to use, as it lights even in wet conditions due to its high natural oil content. Look for kindling off the ground and see if you can find branches that have been protected from the rain by the above tree cover. You are listening for that cracking sound as you break them off; remember you might have to remove the bark to get rid of the excess moisture. One of the best ways to get your fire going in adverse weather conditions is to use feather sticks. Feather sticks are branches processed down to catch fire very easily. First thing you are going to want to do is find a dry stick about 10 inches long and up to about 3 fingers in diameter. When you are

looking for the sticks try and find ones that have a slight natural curve on them as this will help when you run your blade down it as your knife will follow the natural curvature of the branch. Ensure there are no knots in the wood as this will hinder the process. You are going to want to work on a hard, flat surface and ensure you are always cutting away from your body. Angle your knife slightly towards the wood ensuring that you have a firm grip of it from the top and start to run your blade down the wood creating small shavings, stop just before you reach the bottom to stop the shavings peeling off the stick. Slightly turn the wood and run the knife along the edge. You have just created from your first cut. Repeat this process until the branch is completely feathered.



Once mastered you can process feather sticks down so fine that they will take a spark with a ferro rod once you have mastered this technique you will be able to get a fire going in any weather condition. All your fuel will have to be processed down with your knife and hatchet to reveal the dry inner wood so it will ignite easier.



One method we have not touched on yet is fire by friction as this method would not be recommended to rely upon in a survival situation as there is a lot more to it than just rubbing two sticks together. You will need the following bits of kit to practice this technique; a bearing block, spindle, bow with cord dust tray and a heath board.



Bearing block



Hearth board



Spindle



Bow



Dust board

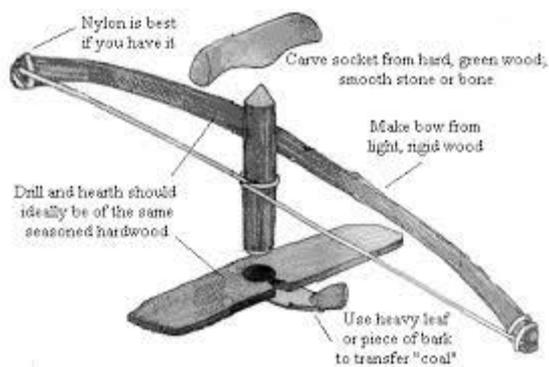
The Bearing block is used to hold the spindle in place whilst it is being rotated back and forth. Use hardwood as this will stand up to the task a lot better than soft wood. The bearing block can be made from many things such as bone, sea shells, stones and steel.

Spindles can be made from hard wood and soft wood, it is just a matter of getting out there and practising with different wood types. The length of the spindles are usually eight to sixteen inches high - an inch diameter is a good start but depending on the wood type, experiment to see what size works best for you. There are a couple of ways to lower the friction from the bearing block to the spindle, for example you can use lubrication such as Vaseline etc to help smooth the motion. You can also sharpen the end of the spindle that is going to go into the bearing block.

The hearth board and spindle work better if they are from the same wood, but again experiment and see what works best for you. Ivy works very well together. The base board should be cut from soft wood and you should make it about  $\frac{3}{4}$  to an inch thick. Make sure the wood you are using is completely dry, you might need to dry it out properly before use; this will massively improve your chances of getting an ember. To prepare your hearth board you are going to need to set up the proper drill locations for your spindle. Do this by placing the spindle about half an inch back from the edge and mark the point. Use your knife to create a small hole depression and then drill for about 30 seconds to clearly mark the diameter. In order for the wood dust created to shape into a coal, you need a properly cut out notch on the board for the dust to collect on the dust board.



The bow is the easiest piece to make, look for a stick with a slight bend in it and place your para cord between the ends ensuring that it is not too tight as you will struggle to wrap your spindle into it. As seen below this is how it should all go together. Once the ember is formed it is about transferring it safely across to your tinder bundle and blowing on the ember to bring it to life enough to combust your tinder.



## Location



So we have covered the entire protection element of the PLAN-M, we are now going to cover Location in depth. Being located by potential rescuers can be made easier before you even step out your door, by making emergency action plans and route cards as mentioned before at the beginning of this

handout. They can be left with loved ones so they know your intentions and what to do if you are faced with an emergency situation. You are going to want to make yourself as visible as possible so think about why things are seen; i.e. shape, shine, silhouette, spacing, shadow, texture and movement. When thinking about location there are 3 stages you want to think about; how will you attract your potential rescuers attention to ensure they see, once you've attracted their attention how are you going to make sure you hold it and ensure they understand the seriousness of the problem. Then of course you are going to have to direct them to your base camp because rescuers may walk by your location action plan when you're away collecting water or firewood etc. you could potentially leave notes with bearings and distances on them to direct your rescuers to your location.

A location action plan is exactly as it sounds; it is a plan to ensure that everyone in the group has a specific job to do if a potential rescue is possible. You can write up a roster to ensure everyone knows their job. You should have a day plan and an evening one written up.

When you start to set out your location plan, every item you place out will fall into one of two categories; passive and active. A passive item is something you can place out and it will do its job without you having to be there to either turn it on or light it on fire, for example a torn up space blanket placed on string that will rustle in the wind and reflect the sun. An active item is something that you will have to physically turn on or light on fire to make it work as a location device. An example of an active location device could be a whistle as you have to physically blow into it for it to do its job.

When picking your sight for your location action plan make sure it is not covered by trees above as this can hinder smoke signals and obviously obstruct potential rescuers views from above. Sometimes it will be hard to find an opening in the woods so just make the best decision possible at the time on where to start your location plan. Sometimes you will be able to leave the

woods and place your location plan in the open which will make things easier for you to grab attention from the air. Linear features will stick out from the sky as straight lines in nature are very unnatural things. So placing parts of your location plan next to a river, for example, will help to catch the attention of potential rescuers from above. If the river has a prominent bend in it that will be a good place to put certain items as this will naturally attract the eyes attention as well. Make sure that the items you are placing down contrast with the area around them and stand out.

So we will cover a few different things we can use in a location action plan that will give us the best possible chance of being rescued.

- Ground to air signals are a very effective means of being located in a rescue situation. These should be at least 3 metres long; lines should have a length to width ratio of 6:1. The symbols may be formed by any means such as survival blankets/bags, logs, stones, de-turfing and pieces of wreckage if the situation dictates.

### Ground to Air Symbols

V	-Assistance Required
X	-Medical Assistance Required
N	-No
Y	-Yes
→	-Proceeding in this Direction
F	-Food and Water Required

- Marker panels are pieces of kit that are usually carried by all pilots in the military as an aid for location. They can be made from any kind of bright coloured material that contrasts with its back ground. The detection range for the marker panels is up to 2 1/2 miles.



- Tinsel trees are lengths of paracord with strips of space blanket or various pieces of shiny reflective material attached to them to allow the sun to reflect of them to direct flashes of light in all different directions. This is a very easy passive location method to make and can be made into a night to device by adding glow sticks to it. If paracord is not available you can just pierce the pieces of space blanket straight onto the tree.



- Head torches can be used as a device to attract attention at night. Most torches have strobe functions which will enhance the torch in a location role. You can also use the torch to send a SOS Morse code signal ...\_\_ \_\_ ... you would flash 3 times fast, 3 prolonged flashes and finish with 3 fast.

- Signal flares location usually and



are a come night



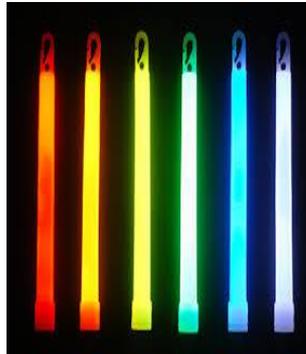
distress very good device and with a day end on them.

The day end will usually be orange smoke which will be visible for about 10 miles. The night end will usually be a re flare and it can be seen from distances of up to 22 miles away. They have a burn time of approx. 20 seconds.

- Cyalume sticks (light sticks) they only offer about 500 metres detection distance on a dark night. You can attach a piece of string to the light stick and twirl it above your head making a massive light circle which will increase the distance



it can be detected from. You can also place the light sticks on water as they float.



- Voice can carry for over a mile in good conditions but can become very energy sapping if done for a long period of time.
- Whistles are a more energy sufficient way to be located and take up no room at all in your pocket. Most bags that get sold in outdoor shop for hiking etc usually have whistles attached to them permanently, so there is no excuse for leaving the house without one. You should know the international distress signal for the whistle which is as follows 6 whistle blasts over the space of a minute and keep repeating this process, if your blasts are heard you will hear 3 in return. Repeat this process until help finds you.



- Mobile phones should always be carried with you when you venture outdoors. Keep them in water proof cases and it is always good practise to get a pack up power pack to recharge your phone if needed. You can contact mountain rescue by either phoning 999 asking for the police then asking for mountain rescue, or either phoning 112 and getting mountain rescue direct. Another service that is massively advised that you register with is the 999 text service this service works by allowing you to send a text message to the emergency services stating your problem. As we all know in the mountains it is very rare to get mobile signal to make a call due to limited signal, sending a text message takes barely any signal to send and gives you a much higher chance of getting in contact with the emergency services. To register just text REGISTER to 999 and follow the instructions - you must be registered to use this service.



- Signal mirrors are by far the most underestimated location device and again like the whistle take up next to no room in your pack. Heliograph as some people might know them. They work by pointing the mirror directly at the light source to reflect the light in the given direction. They have been known to be seen from 45 miles away. They can be hung from the camp to act as a passive location device as well as an active. Be aware that you will not be able to signal aircrafts approaching from the north as the sun is never in the northern part of the sky.



- Signal fires are a very effective way of gaining attention quickly if the weather doesn't favour using the heliograph. Signal fires can be made from a variety of items and made in a variety of ways. For example, if you were the survivor of a plane crash or a car crash there would be a number of items you could burn to give off smoke like the tyres of the car/plane and the fuel would also burn easily. Burning rubber gives off thick black plumes of smoke unlike green vegetation like mosses and pine/spruce boughs that give off big white plumes of smoke. This brings me onto another option you can consider when making signal fires and that is to construct tripods to hold your green vegetation on to generate a lot of smoke quickly. You simply build a tripod using 3 sticks, build a raft in the middle to hold dry tinder and kindling. To get the tripod to light on fire as soon as possible, you pile loads of green vegetation on top of the tripod to ensure you generate a lot of smoke. When building these tripods you want to make 3 and form a triangle with each tripod about 30 metres apart. This is an internationally recognised distress signal. It is also a good idea to build 3 because someone could just mistake your 1 tripod signal



fire for something just camping or burning wood. Ensuring you build the first one close to your camp then space the other 2 out and be sure to have a full proof plan for getting them lit straight away. Make sure that the tinder and kindling is kept dry at all times.

- Phoenix junior is a small strobe light that attaches to a 9 volt battery and gives off a flash of red, green or infra-red depending on the model.



That is the end of the location part we will now move onto acquisition and we will start with water as we will remember with the rule of 3; we have 3 days without water and 3 weeks without food so we need to priorities correctly.

## Water

So we will start with just how important it is for our bodies to have water, as most of us have probably heard before water is the essence of life. Without water we would die very quickly and not just humans, animals and plants depend on it as well. I will now list some important reasons why our bodies depend on water.

- Water makes up approximately 80% of brain tissue; it protects the organ from bumps and jarring.
- Water moistens tissues such as in the nose, mouth and eyes.
- Water makes up approximately 22% of bones.
- Water provides cushioning for the joints.
- Helps to regulate body temperature through sweating.
- Water enables the body to flush out waste and toxins through the bladder.
- Water carries oxygen, nutrients and other essentials around the body.

That is just a few things that water does for the human body, so if we don't drink enough water what happens to us? Well we start to go through different stages of dehydration which we will cover now.

Thirst is the bodies' way of letting you know you are around 5% dehydrated and you need to satisfy that need ASAP. Soon to follow is irritability and weakness, additionally nausea is also soon to follow. Nausea is the early stages of shock. At 10% dehydration you will experience dizziness, headaches, trouble getting up or walking and overall body weakness, pain and even tingling in your extremities.

At 15% dehydration your vision will start to get a little fuzzy, you may drift in and out of conciseness and if you have to pee it will be painful. Your tongue will also be swollen; your throat will be dry and hard to swallow and your head will be pounding in pain.

One option to help you from getting dehydrated is to over drink before you leave your house. Your body can hold a lot more water than any water bladder or water bottle. If you do end up in a survival situation at least you won't start dehydrated.

In a survival situation you have got to balance what you eat with the amount of water you have as food consists of carbohydrates (mainly sugar and starch), proteins(which form the main part of lean meat) and fats (which include vegetable oils). As we know carbs and fats are used to supply our bodies with

sufficient energy to carry out our normal day to day tasks. Proteins are used to repair natural wear and tear on our bodies. Water is required by the body to utilise food correctly, food must be chewed before swallowing and this uses saliva. The digestion of protein and fats produces waste material which must be excreted in urine and this requires the use of body water. Carbohydrates do not produce waste when digested, and provide a more readily form of energy. Glucose sweets are the best survival food to keep in your survival tin as the glucose will prevent the body from having to break down as much protein and fat supplies thus helping prevent dehydration. A starving person first consumes any carbohydrate reserves, which are usually small and only last a few hours. After this, body fats are broken down to supply the energy and finally muscle protein is used.

The next thing I would like to talk about is water borne diseases, which come in the shape of pathogens. Pathogens are organisms that cause diseases; they include microorganisms such as bacteria, viruses and protozoa.

- The first water borne diseases we will talk about is giardia which is a protozoa. Giardia has a two-stage lifecycle. The first stage being the active stage, which is when the protozoa is absorbing nutrients from its hoist. The second stage is the dormant cyst which is passed in faecal matter from the hoist usually an animal. The cyst is usually a lot harder than the original stage of the protozoa and is able to survive in an outside environment. Only a few cysts need to be ingested and enter our digestive tract to be affective. Symptoms- usually after 7- 10 days after ingestion you will expect large volumes of loose, foul smelling stools. Sudden onset of explosive diarrhoea 7-10 days after infection also nausea, vomiting, headaches and a slight fever. Acute symptoms last up to 21 days.
- Cryptosporidium is the next one we will talk about and is a protozoa similar to giardia in many ways. It is protected also protected by an outer shell that allows it to survive outside the body for long periods of time. Due to this tough outer shell crypto is very tolerant to chlorine disinfection, much more so than giardia. Symptoms can start with the loss of appetite, nausea and abdominal pain. This is usually followed by foul smelling, watery diarrhoea, vomiting and there may be a mild fever and noticeable weight loss.
- E.coli is a bacteria that normally lives in the intestine of people and animals. Most intestinal infections are caused by contaminated water or food. The bacteria can enter your body in a number of ways, food processing, slaughtering animals with the bacteria in there intestines, contaminated water and if you work with animals especially cows, goats and sheep you are a greater risk of contracting this bacteria, ensure to wash your hands properly after contact with these animals. Symptoms include abdominal cramping, sudden and severe watery diarrhoea, gas, fatigue and fever.
- Hepatitis is a common virus and there are 5 main types of hepatitis and they are A, B, C, D, and E. The two that are most commonly contacted through food

and water are A and E. Symptoms include nausea, loss of appetite, dark coloured urine and abdominal pain.

These are just a few common water borne diseases and it is worth doing some personal research to better your own knowledge on this subject as it is a very important element to survival.

We will now cover the process you should follow to ensure that the water you are consuming in a survival situation is 100% safe and will not make you ill. Having any symptoms of the water borne diseases mentioned above during a survival situation can greatly decrease your chances of making it through the situation. The process you will follow which will ensure you acquire safe drinking water is as follows SEDIMENTATION, FILTRATION, and PURIFICATION. So what do I mean by sedimentation? Sedimentation is the accumulation of sand and dirt or any particles in the water that settle at the bottom of the water source. Ensure once you collect your water you allow whatever crap is floating about in there to settle to the bottom before you go onto the next stage which filtration.

There are different ways to filter your water and they can either be the water filters you buy from the shops or ones you have made yourself. We will talk about a few different methods now.

First thing I'm going to touch on are the natural water filters you can make if you do not have a filtration device with you at your time of need. So in a worst case scenario where you have nothing but the clothes on your back in your survival situation, you can still filter water to a certain degree. Your T-shirt could be used for filtration - pour the water source through the fabric and it will catch the worst of the sedimentation. Fold the T-shirt over on itself a few times and it will do a greater job of filtering the water. This method will not remove any of your water borne diseases; you will still need to purify your water by some means. A good piece of kit you can keep in your back pack when you're outdoors is a Millbank bag. They are canvas bags tightly sewn together to catch slightly more sediment than your T-shirt would, but you will still need to purify your water once it has been filtered through the mill bank bag. Mill bank bags process water slowly so you are best to set it up as soon as you get into camp. They



process round about 1  $\frac{3}{4}$  litres in 5 minutes. When you first get your Mill bank bag put it into the washing machine to soften up the canvas slightly or the process of filtration can be a lot longer than the above timings.

Another method of making a natural filter is to make a birch bark filter. This can be done by scoring a birch tree all the way round ensuring you have a length of



birch about the same as your forearm. This method should only be used in an emergency and not just for practice as this can damage the birch trees. If you find a downed birch tree it is fine to practise this method. To score a piece of birch bark from the tree you are best to baton your knife all the way round the tree to ensure you go deep enough so when it comes to pulling it off you have a better chance of not ripping it. Once you have went round the tree the whole way, join the two horizontal cuts with a vertical one and start to gently peel away the bark. Once you have removed the birch bark, cut it into a square and roll it from the middle to make a cone shaped funnel. Once it has been rolled it will need something to stop it from unravelling, you can cut a small stick from a tree and split it down the middle but not all the way so you half it. This can now act as a peg to hold the funnel together. So next you will have to find materials to place into your water filter. First you want to put a layer of grass on the bottom so you can add finer materials to the filter, the grass stops the finer materials from simply falling out the bottom. From here you want to fill the filter with material working from coarse to fine as you work down the filter. An example of this can be coarse gravel, fine gravel, coarse sand, charcoal fragments and finish it off with fine sand.

If you manage to find an empty bottle you can apply the same principle as the birch bark filter to it. Simply cut away the bottom half of the bottle which will leave you with the neck of the bottle, so the water can run out from here once it has passed through your filtration system. Layer the bottom part of the bottle with either grass, moss or something that will stop the finer materials falling through. You can also build a tripod filter if you are going to be in one location for a lengthy amount of time. To make this grab three stick of the same size and tie them together to make a tripod. If you have triangular bandages in your survival med kit you can use these to make shelves in-between the tripod to place your filtering materials on. Parachute material works well or clothing use what you have to make it work.



So that has covered natural filters you can make in a survival situation, we will now cover what kind of water filters are available to buy straight from the shops we are not going to cover every single filter but we will cover the most popular ones on the market. Most filters work by using three stage system the first being a larger filter to catch any large pieces of debris that pass through, moving onto the ceramic filter which filters the smallest types of pathogens out depending what micron level it works down to. Some have a iodine based resin in there filters to help with removing the viruses and some systems will have a carbon filter in there as well to help remove chemical contamination and excess iodine.

Contaminants	Size
Giardia	8 to 12
Crypto	4 to 6
Bacteria (E.coli)	0.2 to 4
Viruses	0.004 to 0.1

The table above shows you the different sizes of the microns per each contaminant. This will allow you to see what is and isn't filtered by commercial filters when they give you their statistics on the packaging. The commercial water filters allow us to go into microfiltration and ultrafiltration.

Microfiltration filters have pore sizes of approximately 0.1 ( but pore sizes range from 0.05 to 5 microns, dependant on the product. Microfiltration is not effective in removing viruses and not effective against removing chemicals.

Ultrafiltration has a pore size of approximately 0.01 microns (pore sizes range from 0.1 to 0.05 microns dependant on the product in question.) Ultrafiltration has a moderate effect in removing viruses and also a low effect with removing chemicals.

- The first filter we will talk about is the life saver bottle. It can filter out cysts, parasites, bacteria, fungi and other aquatic pathogens without the use of chemicals. The filter pores are so small at



0.015 microns. The smallest known virus is polio and it is 0.025 microns so the

lifesaver bottle is excellent at filtering out even the smallest water borne diseases. The bottle comes in two models- the 4000 and the 6000. This number tells you how many litres of water the bottle can filter before the filter needs changed. The life saver bottle has a failsafe system built into it to ensure you never accidentally drink contaminated water - when the filter is coming to the end of its life the water will no longer be able to flow through the system.

- The next filter we will talk about is the sawyer mini filter. This filter is small and light and fits easily into any pocket. It weighs 1.4 ounces and is good to filter 100,000 gallons of water. It has a 0.1 micron pore size in its hollow fibre membrane filter making it effective in filtering protozoa, bacteria, and the hard-shelled cryptosporidium. It does not treat viruses. It can also be attached to a bottle and can be used with a straw which all comes with the sawyer mini when you buy it.



- The last water filter we will talk about is the water to go bottles. It is one of the only filter systems that can filter out metals and chemicals. It works with nano alumina and activated carbon. The nano alumina emits a positive charge when wet and attracts the negative charged contaminants of protozoa, bacteria and viruses.

There are plenty more filters on the market - make sure you do your research on each before you commit to buying one.

We have covered Filtration in a natural means and products you can buy from shop. The water filters you buy from the shop are hassle free as you can drink straight from them and do not have to purify it once it has passed through the filter. This however is not the case if you are using one of the natural made water filters - you will still need to purify the water before you drink it. This can be done in a number of ways which we will cover now.

- The most reliable way of purifying your water is to boil it. Water boils at 100 degrees and at this temperature it will kill 99.9% of all organic pathogens. Giardia cysts will die at 60 deg and cryptosporidium dies at 65 deg. As long as you go by the saying, big bubbles no troubles you will not have a problem when boiling your water to purify it.
- Iodine is another method of treating water, the one problem with iodine is it can be harmful in large doses as it can damage the thyroid gland in your neck. Iodine works by upsetting the ion balance within the cells of the water borne diseases. It replaces chemicals that the pathogens need to survive with iodide ion. Sphagnum moss contains natural iodine in it, which is very useful to use when put into a natural filter.



- Chlorine dioxide tablets work by destroying the cell walls of the water borne diseases and killing them. Fortunately, when we drink chlorinated water, our digestive system quickly neutralizes the chlorine.
- Potassium Permanganate can be used as a water purifier as well; it can be purchased at any hardware store. It is sold as a water softener and can be



purchased in pill or powder form. Mix a few crystals into the water until it turns a light pink leave for 10 minutes then it can be drunk.

- Household bleach can be used for water purification, two drops of bleach per gallon of water.



There are a few different ways to acquire water if there are no immediate water sources in your area.

- The simplest method you can do is set up a tarp and collect the rain water into a bottle, ensure the tarp is clean and not been in contact with any contaminants. If there is any doubt about the cleanliness of the tarp the water will need to be purified.



- Collecting morning dew from vegetation - you can tie cotton clothes to your ankles and walk through the long grass in the morning and collect all the dew from the vegetation. Once you've walk through the vegetation a couple of times you can ring the clothes into a bottle. With this method ensure you do not collect dew from any poisonous plants. You will still need to purify the water once collected.



- Transpiration bags can also be used to collect water from vegetation, grab a large bag and you can either pull up vegetation and put it into the bag or wrap the bag around live branch with plenty of vegetation on it. Ensure you place a small rock in the bottom corner so the water will collect in that corner. Tie up the bag from the top and allow the vegetation to sweat which will cause condensation which will run down into the corner where the rock is. It works a lot better if it is placed in direct sunlight. This method is not recommended for a main water supply but used to supplement your main water supply. Be careful not to pick any poisonous plants and put them in the bag or place the bag over a poisonous tree.



- Solar stills are another method that is similar to the transpiration bags. You will need to dig a hole 0.5 metres wide and 0.5 metres deep place some vegetation in the hole or put some undrinkable water in the corner this can also be urine you will need to put a clean container in the middle to collect the clean water. Once you have placed your items in the hole you will need to cover it with a plastic sheet and place a stone in the middle to allow all the condensation from the contaminated water and vegetation to run down into the middle and drop into the clean container. You can place a drinking tube from the clean water container to the outside of the sheet so you don't have to constantly remove the sheet to collect the water.



- Seep wells are another way of getting to water, if you are in an area where the water table is high you can dig down and the hole you create will start to fill up with water. If you scoop out the water the first few times it fills up, it will gradually become cleaner and cleaner. You will still need to purify the water once you collect it



- Another way you can use a seep well is to add hot rocks into it to bring the water to a boil. Ensure when you collect rocks to put in your fire they are none porous so they do not explode when heated.

If you are in a cold environment and there is not access to running water you will have to use snow and ice to get your water. Ensure you do not just eat the snow or ice as this will lower your body temperature. You will need to melt the snow or ice down to drink it. Ice will melt quicker than snow so if you have the choice pick the ice as this will use less of your fire materials.

If you are at sea you will have to use a solar still method to make the sea water drinkable by evaporation. You can use a reverse- osmosis pump to change the sea water into drinking water. The pump pushes sea water at very high pressure through a membrane that filters out the salt.

I want to finish off the water part of this handout by explaining the 5 methods of treating water and they are Desalination, Reverse osmosis, filtration, disinfection and sterilization.

- Desalination refers to removing the salt from the sea water
- Reverse osmosis
- Filtration is passing water through a filter to strain or otherwise remove contaminants.
- Disinfection removes or destroys harmful bacteria and microorganisms.
- Sterilization is when you sterilize harmful bacteria and microorganisms so they can't reproduce in your body.

## **Food**

The next part we are going to talk about is food. Food comes pretty low in our priorities when survival is concerned, as you will remember from the rule of 3's we have 3 weeks without food. If we had food and no water in a survival situation we would have to consider whether or not it will be worth eating because as you will remember from what I said in the water part of this handout, the body requires water to process certain types of food (proteins and Fats). You could further dehydrate yourself if you choose to eat your food stash. So when it comes to our food in a survival situation we might have a small supply of food to last us a small amount of time but sooner or later we are going to have to find some way of sourcing our own food. We will do this through trapping and foraging. I will cover different traps that can be made and set up

with relative ease and cover a few easy to identify wild edibles that can be used to supplement your diet.

When we speak about trapping we cover STRANGLE, MANGLE, DANGLE and TANGLE. These are the different types of mechanisms you can set up to hopefully help you catch your dinner. Before we talk about trapping we will cover the snaring laws in the UK. Under the wildlife and countryside act 1981 and wildlife order 1985, free running snares are legal throughout the UK, while self-locking snares are illegal. A free running snare is supposed to slacken when the animal stops struggling, while a self-locking snare can only become tighter. Snare may not be used on certain animals including badgers, wild cats, hedgehogs, pine martins, otters and red squirrels. In England and Wales you can set up snares as long as you have the permission of the land owner. Scotland has different laws which state if you want to set snares they all have to be tagged with an identification number on them which can be traced back to you. The snare cannot close to a circumference less than 23 cm for a fox or 13cm for any other animal.

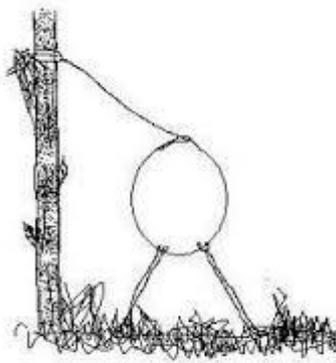
These techniques we are going to cover should only be used in an emergency situation.

So when it comes to trapping we can't just simply put traps out anywhere we want and just hope that an animal will walk straight into it. Animals are not stupid and can easily sense when something isn't right. We need to work off a ratio of 15:1 (meaning setting 15 traps to hopefully get 1 animal). It could be a good idea to do some scouting of the area you are working in as this may allow you to find some animal trails leading to water sources and animal hides. When you put your traps out avoid putting them in front of animal hides as the animals are very alert when coming in and out of their homes. Try and place them in transition areas, for example an area of wood going into open grassland. Usually you can find fences along the Woodline that separates the wood from the grass land. If you look along the fence you can find holes where rabbits and other animals go through each day to either get to food or water or to simply get out the wood to warm up in the sun. These holes would be perfect to set up your snares. When constructing your traps you should do it away from the area you intend to place them and try your best to minimise the time you are in contact with the trap itself as this will leave your scent on it. Ways to help avoid this are to wear gloves and put it in the smoke of the fire to get rid of your scent. Ensure you use the same wood for construction, never set a hazel trap in a pine forest. You want to set your traps and snare in the late afternoon, check them at first light. Leave the traps relaxed during the day to increase their longevity, assuming you are targeting nocturnal animals.

So the first part of the trapping mechanisms we will cover is strangle. This is the simplest traps to construct as they are just simple snares. Most survival kits you buy off the shelf come with brass wire that you have to make into a snare by

yourself. To make the snare you need to cut off a length as long as your arm span and fold it into 4 strands. Pass the strands around a stick and place the stick on the ground. Loop the loose end around a second stick, place your feet on the bottom stick and rotate the top stick until the strands have entwined forming a single, thick wire. Remove the sticks and to make the noose, pass the imperfect end (the end which was closest to your hands) through the perfect end. Tie a piece of cord to the imperfect end to allow the snare to be attached to a stake or something similar.

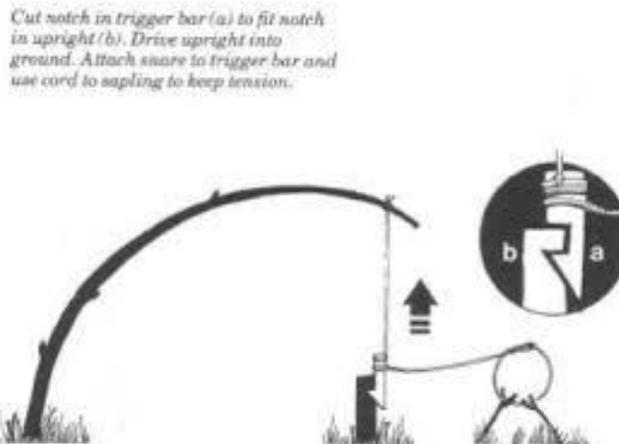
When setting the snare you want to drive a stake into the ground as deep as possible, remember the animal is going to be fighting for its life. Once the stake is in place you measure a hands length from the stake to where the noose will sit and hold it at the correct height by using a teeler stick. As a rule of thumb you want to go one fist from the ground for rabbits and hares, two fists for grouses and pheasants and waist height if you are trapping roe deer. The noose hole itself wants to be about a fist in size, if you start to trap bigger animals you will just have to estimate the size of the noose to fit that specific animal.



The snare above is by far the easiest trap to set up but there is a down side to it. If you are lucky enough and catch something in your snare through the night there could be a strong possibility that a fox or other animal could come along and get a free meal. To avoid this from happening we can use another trap mechanism which is DANGLE. These traps work by lifting your prey off the ground and removing them out of potential predators reaches.

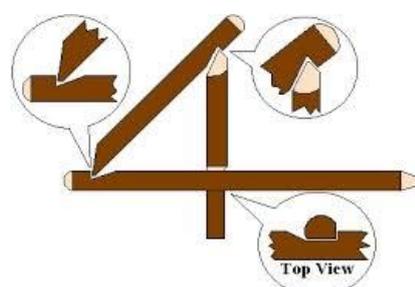
The Spring snare is the easiest DANGLE mechanism to set up. The first thing you are going to have to look for is a good animal trail with a few saplings nearby (baby trees). Saplings are ideal for setting up spring snares as they have a lot of spring in them. When you find one and it doesn't have as much spring as you like you might have to remove a few branches as this will reduce the drag the sapling has after it is realised from its bent over position. Ensure if you have to do any cutting of the sapling you remove the evidence of this as the animal will sense something has changed in the area. Once you are happy you have found a decent sapling near an animal trail you will need to collect two lengths of wood - one is going to be the stake stick, which is going to be driving

into the ground so ensure it is long enough so it can go deep enough into the ground so the sapling doesn't pull it straight out . Before you place the stick into the ground you will need to carve a number 7 notch into the stick that is going into the ground and an opposing number 7 notch into the stick that will be attached to the sapling.

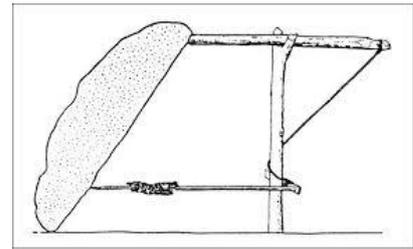


Once you have carved both notches drive the ground stake into the ground ensuring that it will not be pulled out by the sapling. You then need to get a piece of cordage and attach it to the sapling, it is better to cut a small notch all the way round the sapling for the cordage to sit in so it does not slip. Then bring the cordage down towards the ground stake and work out where you are going to have to tie on the trigger stick to get the correct tension in the trap. Once you are happy carve a notch in the bait stick for the cordage to fit into and tie it on. You are then going to have to see if the notches hold together - you might need to do some fine adjustments to make them fit correctly. Finally, you need to connect your snare to the trigger stick and place it onto the game trail, again ensure you carve a notch for the snare to sit in so it doesn't slide about.

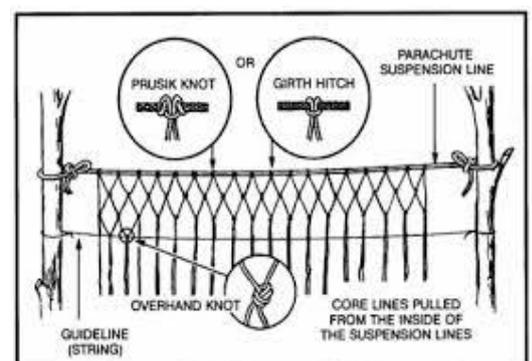
The next mechanism we will cover is MANGLE. This is when you use heavy objects to crush and kill your potential dinner. The figure 4 deadfall trap is what we are going to cover as this trap is very simple to set up and can be made from 100% natural materials. You are going to need to find 3 sticks for this trap and a heavy object to use to kill your prey. When picking the weighted object you want it to be 4 x heavier than what you are trying to catch. The picture below shows you how to construct the notches required for the Figure 4 to work as we all know a picture paints a thousand words; this trap is much easier to show you rather than me explaining each part as it would get confusing.



Another type of figure 4 trap is the Paiute deadfall. It is similar to the figure 4 but you will require cordage to complete the trap. You will need to collect 4 sticks for this trap; one vertical stick, a weight bearing stick, a toggle stick and a bait stick. Carve a point in the vertical stick; grab the weight bearing stick and about 2 inches from the top carve a notch so it can balance on the vertical stick. Once the notch is carved on the weight bearing stick you will need to attach cordage to the opposite end of the stick. The cordage should be as long as the weight bearing stick. Cut a notch in the weight bearing stick so the cordage fits in properly. Attach your toggle stick to the opposite end of the cordage, once attached grab your weight for the trap it can be a stone, log or whatever you can get. Place the vertical stick in place and grab the weight bearing stick, put the notches together and balance the weight on the end of the weight bearing stick. This part can be difficult as it is all about balance grab the cordage with the toggle on it and pass the toggle around the vertical stick. You should be able to hold the weight up now just by holding the toggle in place with your hand, you are going to put your bait stick down to hold the toggle in place and stop it from spinning back round the vertical stick. The picture below will explain in greater detail.



The last mechanism we are going to cover is TANGLE, this is when we use nets to tangle up our prey and catch them. The main source of food when using nets is fish; we are going to speak about a gill net. A gill net is a net that is placed in a water source where fish usually travel down. The fish swim into the net and get trapped in it by their gills. These gill nets may only be used in a true life or death situation and can't be used for general fishing as they are very effective. To make a gill net from scratch you will need some 550 paracord cut a piece about an arm spans length and pull out the inner part of the 550 cord. Attach the outer sheath of paracord to a tree so it is suspended in the air. Grab the inner parts of the paracord and larks foot them onto the outer sheath all the way along it leaving a two finger gap between each piece. Once you have strung the inner



parts of the paracord all the way down the outer shell you can start to tie all the pieces together using over hand knots. Start from the top left and work your way across joining each piece together with an overhand knot. You can use a guide line to ensure you stay level throughout the whole process and keep the holes the same size, but you are better to mix the hole size up as this will give your gill net a better chance of catching different size fish. The diagram below will hopefully explain the process further. Once finished you will need to weigh it down with rocks so it will sink to the bottom of wherever you might want to put it.

It is a good idea to invest in a small survival fishing kit, just by having some fishing line, hooks, weights, lures and fly's you can set up certain things like night lines. A night line is when you get yourself a piece of fishing line and lie it down horizontally on the floor, you then want to start attaching other pieces of fishing line onto the horizontal piece so they lie vertically of it ensure you spread them out evenly and enough so that they don't get tangled on each other when you put it in the water. Place your hooks on the end and bait them with worms or something similar. You want to attach one end to a stake in the ground at the edge of a deep water source insuring it is not too deep. So when you throw in your night line the rock attached to the bottom part of it does not just pull the line straight of the stake. The fishing line you attached all the way down the main line will sit at different depths in the water attracting your surface feeding fish and the bottom feeding fish.



We can also eat wild edibles which can be picked from the forest floor; you need to be 100% positive in what you are picking to ensure you do not poison yourself as this will be deadly in a survival situation. We will cover 5 easily identifiable wild edible starting with.

- Wood sorrel is widely considered to be the plant that St. Patrick used to demonstrate the trinity to the ancient Irish. It is distinguished by its clover-like leaves, arranged alternately along the stem, divided into 3 heart-shaped leaflets. It also produces flowers between April and May; the flowers have five white petals. You can find wood sorrel in shady areas, pretty much everywhere without tons of direct sunlight. It has diuretic, antiscorbutic and cooling properties. The cooling factor is very useful when treating fevers. The diuretic property can help with urinary disorders. Its soothing to the stomach relieves indigestion, can help stop vomiting. It also acts as an astringent which constricts blood vessels. Wood sorrel contains high amounts of potassium oxalate and oxalic acid and should be avoided by people with kidney problems
- Rosebay willow herb is widespread in woodland clearings, identified by its pink



flowers in dramatic spikes up to 1.5m high span. The young shoots have been eaten. The leaves resemble those of willow herb. The inner pith of the stems are full of makes for good eating. The flowers can also pods of the flower can be collected and used



- Pignut occurs on well drained soils in grasslands and woodlands. A slender, single stemmed perennial, 20- 80cm high. Leaves feathery with narrow lobes. White flowers. In dense, flat heads. May to July are the life span. If you gently dig down following the stem you will come to the roundish nut which is dark brown and the size of a walnut. It can be eaten raw once you scrape of the skin which will reveal its white surface. It tastes very similar to a hazel nut and is a good source of carbohydrate. It is illegal to dig up pignuts unless it is on your land.



- Yarrow is a long stemmed member of the sunflower family found in the wild throughout the temperate regions of the northern hemisphere. It can be recognised by its highly segmented leaves and clusters of daisy-like white or lavender flowers at the top of the stalk. They flower all the way up to Christmas. Yarrow also has an astringent affect which helps to stop bleeding it was said to be used by Achilles to treat his injured soldier's wounds in the battle of troy.



- Dandelions are widespread and abundant in open and grassy places throughout the British isles. The leaves grow from the base of the plant and are roughly toothed. It flowers February to November but especially April to May. Large golden-yellow flowers made up of numerous fine petals, on hollow stems up to 30cm. It has been known for people to use the root to make a coffee substitute which is caffeine free but tastes remarkably like coffee. Every part of this weed is edible but do tend to have a bitter taste, this can be lessened by boiling the leaves and flowers.



There are thousands of wild edibles out there but be sure to do your research before you commit to eating any wild edible. There is loads of books and guides out there to help you when trying to identify wild edibles.

## Navigation

The last part we are going to cover is navigation and this is the most important part out of PLAN- M as most survival situations start with people having poor navigation skills and getting themselves lost. We will cover a few techniques you can use during navigation to keep yourself on track and the basics of map reading but there is no alternative to getting out with a map and compass and practising.

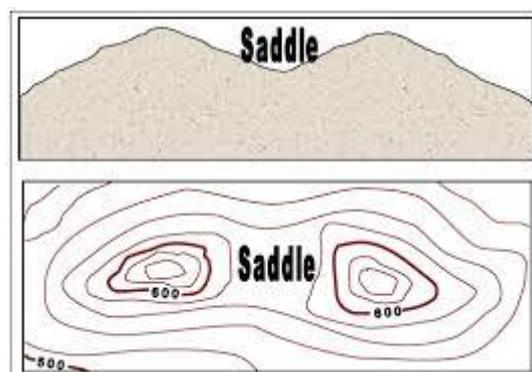
So we will talk about the map first, maps are an essential part to navigation. You can navigate on the map alone by simply relating what you see on the map to the ground. Maps are all drawn to scale, so the distance on the map is in proportion with the actual landscape. You get different types of map scale to use that provides more or less detail. 1:25000 and 1:5000 are the most popular scale to be used, so scale is the relationship between distance on the map and distance on the ground. As an example a map with 1:25000 means that every one unit of measurement on the map ( Like a Centimetre) is the same as 25,000 of those units ( in this case 25,000 cm or 250m) in real life. On the map itself you will see loads of lines, these are called contours, a contour is an

imaginary line drawn on a map along which all points are at the same height. Contours will become your number method for navigation once you have been doing it for a while. Contours rarely change and can be relied upon when navigation. There are a load more features on the map that can be used along with contours to navigate these will all be explained on the legend (the column on the map which explains what all the futures are. You need to be careful when using some of these other features. For a few examples, streams and rivers dry up, paths and tracks are created and can disappear with lack of use, forests are felled and new ones planted, walls and fences are moved, buildings are built and demolished. So that all being said always look to the contours when navigating and use everything else as an aid. I will cover contour features you can see when looking on a map the first one we will cover is a

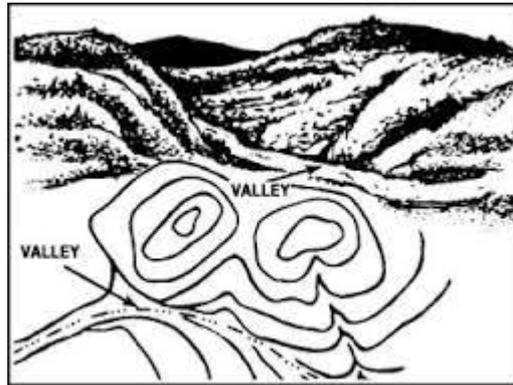
- Hill- a hill is shown on the map by contour lines forming concentric circles. The inside circle of the smallest circle is the hill top.



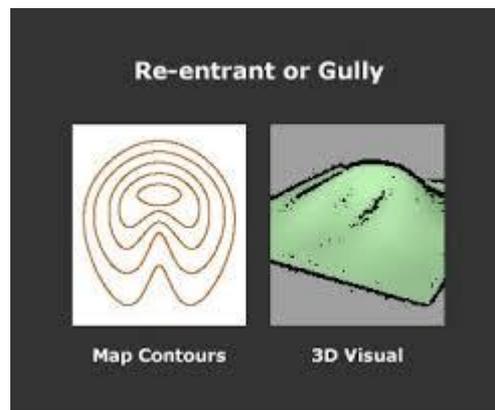
- Saddle- a saddle is normally represented as an hour glass.



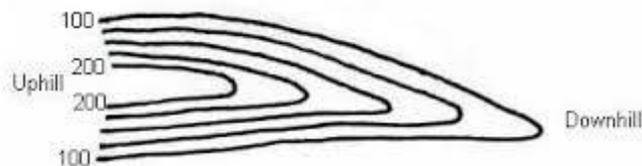
- Valley- The contour lines forming a valley are normally u- shaped or v- shaped.



- Re-entrant – is a small valley. The contour lines depicting a re-entrant are u-shaped or v-shaped, pointing towards high ground.



- Spur – Contour lines on a map depict a spur, pointing away from high ground.

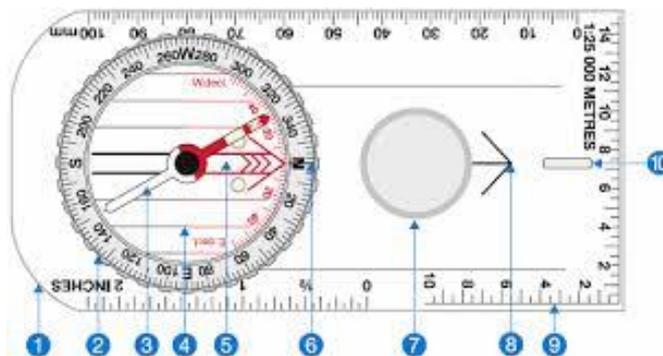


The compass is the next part we are going to talk about. In good weather you will hardly have to use your compass as you will be able to use map to ground skills to navigate yourself around. The compass massively comes into play when the weather turns bad and you will need to take bearings to ensure you stay on the right track. I will cover a few techniques that you can use with the compass and map that will help you if the weather comes in.

Some of the main uses of the compass are as follows.

- Identifying features you can see on the land, by taking their bearing, and finding them on your map.
- Identifying features you can see on your map, using their bearings, and finding them on the land.
- Taking a bearing from your map and then walking on it

- Taking a bearing of a feature in the distance and walking on it.
- Orientating the map so it matches the features on the land allowing you to identify features around you and check the direction of linear features.
- Determining your position using bearings from two or more distant features



**1** = The base plate, a ruler in centimetres plus scale rulers for measuring distance on map sizes 1:50,000, 1:25,000.

**2** = Luminous serrated bezel ring, a rotating bezel which has cardinal points and a full 360 degrees marked on it going up in increments of 2 degrees.

**3** = Luminous compass needle, a one-zoned magnetic needle that pivots on a jewel bearing and is surrounded by liquid so it can rotate freely and smoothly: the red end always points to magnetic north.

**4** = Orienting lines rotate with the bezel and are designed to be aligned with the map grid (the blue lines that run top to bottom on your map)

**5** = Luminous base bar(orienting arrow), needs to be aligned with the compass needle (red north) to take a bearing.

**6** = Luminous index triangle, this is where you will read your bearing.

**7** = Magnifying lens

**8** = Direction of travel arrow

**9** = Romers, used to measure distance and give grid references.

Let's talk about bearings and what they are, a bearing is a means of describing the direction between one object and another. The earth has a natural magnetic field and the compass detects this and points magnetic north. From this you can start to work out the other cardinal directions.

North = 000 Degrees

East = 090 Degrees

South = 180 Degrees

West = 270 Degrees



You will hear about 3 different kinds of north in the margins of most maps and they are True north, Magnetic north and Grid north.

### **True North**

- The direction of the North Pole.
- Marked in the sky by the position of Polaris- the North Star.
- The imaginary axis upon which the earth spins
- Where all lines of longitude meet.
- Located in the middle of the Arctic Ocean

### **Magnetic North**

- The direction in which the compass needle points
- Located west of Greenland
- Slowly moving across the arctic ocean- over the last century magnetic north has moved 1,100 kilometres
- The difference from true north and magnetic north is slowly changing.

### **Grid North**

- Lines of longitude do not run parallel, instead they converge the further north or south you go from the equator. To produce rectangular or square maps , grids have been created and vertical grid lines on these maps point to what is called grid north.

**Magnetic Variation** – The difference between magnetic north and true north at any particular location on earth's surface. Magnetic variation is stated in the legends of most maps. You correct for it simply by either adding or subtracting the number of degrees difference from your bearing. An easy way to remember this is MAG to GRID get rid and GRID to MAG add. This means anytime you take a magnetic bearing and want to convert it to use on the map you subtract the Magnetic variation. If you use a bearing from the map and want to convert it to use on the ground you add the magnetic variation.

The first technique we are going to cover is how to orientate your map to the ground. You can perform this technique by either using your compass or just by looking at the ground and orientating the map by the features in front of you. When using the compass, just place the compass on the map, look at where the compass north (red) is pointing and rotate the map until the needle runs parallel to the vertical lines on your map - it does not matter which way the compass is pointing, only the needle. Using the environment is the other way you can orientate your map, if you know where the sun is (morning easterly/ afternoons westerly), roughly orient your map in relation to the position of the sun and look for features in your surrounding landscape that are marked on your map. Cliffs, paths, walls, streams and coastlines are excellent linear features to align with.

Taking bearings is a skill you will learn early in map reading, there are two ways of taking a bearing: one is by looking directly at the object and using a compass

to walk to it, and the other is by using the map. We will cover taking a bearing by looking at a feature first. You want to get yourself in a nice firm position to take a bearing; get down on one knee and use your thigh as a platform. Ensuring the direction of the travel arrow is pointing towards the feature you wish to take a bearing to, with one hand hold the compass still on your knee and rotate the bezel until the red orienting arrow is exactly underneath the red north needle. The north on your bezel will match the north of your needle. Check again that the compass is pointing exactly towards your identifiable feature and that the arrow and needle are perfectly aligned. The reading at the index triangle is your magnetic bearing to the target. Do not move the bezel again.

Taking a bearing from an object on the map, assume the brace position with your back to the wind; place the map on your knee. Put the compass on the map over the spot, from which you wish to take a bearing, probably where you are. Use the ruler line on the compass to join point A to where you wish to travel point B making sure that the arrow on the compass points in the direction you wish to go. Ignore the compass needle as it is not required for this technique. Rotate the compass bezel until the N on the bezel points north on the map (always the top of the map). Align the compass housing orienting lines parallel with the map's vertical grid lines. The bearing to this object is indicated at the index, follow this bearing on your compass. You will have to adjust for magnetic variation.

The next technique we will cover is the attack point. To follow your route to your objective you navigate a series of short legs. Each leg starts from a known point and leads to an identifiable point on the map known as an attack point. With good visibility your attack point could be as far as the eye can see. However as you travel, the contours of the land can alter causing you to lose sight of it; visibility can change easily in the Scottish hills. Generally the nearer an attack point the safer your navigational leg will be. Try keeping your attack points to a minimum of 500 metres, but these can go a lot lower depending on visibility.

Hand railing is another useful technique to use when navigating. A handrail is an easily identifiable linear feature, marked on your map that you can follow towards your next attack point. Handrails can be

- Walls
- Fences and hedges
- Streams-beds
- Riverbanks
- Ridges
- Valleys
- Paths, roads or tracks
- Forest edges

- Overhead powerlines

Collecting features can be used when navigating a leg, these are features you predict or know will be on your path and mentally collected along the way. Collecting features and back snaps can be used to know where you are at all times. A back snap can be the collecting feature you have just past.

Catching features are used to let you know you have over shot your target and you need to study the map and find out where you went wrong. A catching feature can be a river, path or a change in angle on a slope.

Aiming off is another technique you can use if your final destination isn't immediately visible. For example, if your final destination was a bridge you could take a bearing to the left or right of the bridge so you hit the river. When you hit the river you know you have to turn left or right to hit the bridge.

Boxing is a good technique to get to grips with in order to avoid hard to cross ground. There is a couple of methods used in this technique and we will start by explaining the rough box. This is used when you can clearly see the other side of the obstacle. As you approach the obstacle identify a very clear intermediate landmark that is on your course beyond the obstacle. Stop at the point which you calculate you could look back at from the landmark on the other side. Work your way around the obstacle and when you reach the opposite side turn around and check your back bearing on the compass (rotate your body, not the compass until the WHITE end of the compass needle is exactly over and aligned with the red arrow in the bottom of the compass housing) this will tell you that you are back on the same path.

Back bearings can be used as a quick relocation aid, as you can see in the above technique. We will now explain what they are and different ways of using them. A back bearing is in the opposite direction to your travel. So if you are following a bearing of 070 degrees then to walk back along exactly the same route you're bearing would be 250 degrees this is your back bearing. ( $070 \text{ degrees} + 180 \text{ degrees} = 250 \text{ degrees}$ ) The easiest way to think about back bearings is that whatever bearing the red north needle of your compass is pointing to, the white south needle will be pointing in the opposite direction- the back bearing.

To calculate your back bearing;

- 1- If the bearing is from 000 degrees to 180 degrees, add 180 degrees to calculate back bearing
- 2- If bearing is from 181 degrees to 359 degrees, subtract 180 degrees.

Resections can be done using back bearings to help with pin pointing your location. These are particularly useful if you are next to a linear feature such as

a path, wood line or even on a ridge. There are two ways to use this technique, a quick way and a precise way.

Quick way = from your linear feature identify a prominent feature on the land which will be on your map. Face it, orientate your map and looking down at the feature, follow an imaginary straight line back to the linear feature you are following. Where your imaginary line intersects the linear feature is a rough guide you where you are.

Precise method = assume a stable position facing an easily identifiable feature. Aim your compass carefully at the feature. Turn your compass bezel until the red arrow of the orienting lines is immediately under the red end of the needle. Adjust for magnetic variation then place your compass on your map with the compass edge against the feature you have taking a bearing to. Using the feature as a pivot, rotate the compass until the north on the bezel is pointing to the top of the map and the compass housing orienting lines are parallel with the maps vertical lines. Draw a line along the edge of the compass from the feature you to a bearing to, back to the linear feature you are standing next to. This will give an estimated position.

Pacing is another essential technique in navigation which can be used in poor visibility to keep track of the distance you have covered. To use this technique you need to first go out and find how many paces it takes you to walk 100m. Select a level piece of ground to measure this out - a football pitch is ideal or you can use the map to measure out 100m. From the starting line, walk at your normal pace and count your double step – if you start by putting your left leg forward first, count every step thereafter on your right foot only- this is a double step and counts as one pace. Stop at the end of the distance and record this number. There are certain things that will affect how many paces it takes you to cover 100m for example.

- Slopes – moving up a steep slope
- Winds – in a headwind
- Terrain – crossing sand, gravel, mud, snow or heavy under growth.
- Elements – falling snow, rain or ice
- Apparel – excess clothing, a heavy rucksack, and boots with poor traction.
- Visibility- poor visibility either in bad weather or at night
- Alertness – Mental and physical exhaustion

You need to go out and practice your pacing in different conditions to increase your accuracy.

Timing is another way to keep track of how far you have travelled. If you know how fast you are traveling, you can easily work out how far you have travelled by keeping an eye on how long you have been walking. Timing requires less concentration than pacing and it is more accurate over distances greater than

750m. You can use pacing and timing together to give you great aid in keeping track of how far you have travelled. These two techniques together are vital in poor visibility.

Knowing how fast you are walking is the key and speeds can be generalised as a:

- Gentle stroll 3kph
- Good walking pace 4kph
- Fast walking pace 5kph

Approximate speeds for different terrains	
5kph	Level surface covered in grass
4kph	Variable, rough surface
3kph	Soft snow, strong headwind
2kph	Deep snowdrift, sever headwind

Lots of factors will change how fast you walk so always be mindful and adjust accordingly.

The best thing to carry on you is a timing card which has all the calculations you will need to work out how long it is going to take you to cover certain distances. See example below.

Timing card	Speed				
	2kph	3kph	4kph	5kph	6kph
Distance					
50m	1'30	1	0'45	0'36	0,30
100m	3	2	1'30	1'12	1
200m	6	4	3	2'24	2
300m	9	6	4'30	3'46	3
400m	12	8	6	4'48	4
500m	15	10	7'30	6	5
1,000m	30	20	15	12	10
Going uphill add 1 minute for every 10m contour crossed.					
Going downhill subtract 20 seconds for every contour line crossed.					

Time to add for other conditions	
Darkness	½ daytime speed
Very heavy load >20kg	½ normal speed
Heavy load	Subtract 1kph
Headwind	Subtract 1kph or more if very strong

You can type these up and laminate them and place them in the back of your map case for a quick reference.

Slope aspect – this is one of the most powerful navigation tool to both confirm your location, or, if you are lost, to find your position again.

This technique can be used where there are slopes, as long as you have visibility of at least 10m. There are three stages to this technique.

If you want to just confirm your location, stop and face down the slope you are on. Hold your compass away from your body and point it in the direction of the fall- line down the slope. Take note of the nearest cardinal or point (N, E, S, W) to this direction of travel. Take note of the steepness of the slope you are on and expect to see the contours either close together if steep or spread apart if at a gentler angle. Set your map and search the slopes on the map in the area where you are for one which faces the same direction as the cardinal and where the contours approximately represent its steepness. Look around for any other features that could help you locate your position.

If you are lost and want to relocate your position use the following steps:

Face down the slope you are on. Hold your compass away from your body and point in the direction of the fall- line down the slope. Holding the compass level let the needle float freely; it will point to magnetic north. Holding the compass still, rotate the bezel until the red orienting arrow is exactly underneath the red north of the needle: the north on your bezel will match the north of your needle. Check again that the compass is pointing exactly down the fall- line. The reading at the compass index is your magnetic bearing. Adjust for magnetic variation. Do not move the bezel again. Assume a stable position facing across the slope, back to the wind. Place your map on your knee. Put the compass on the map roughly in the area you think you are in. Align the compass red/black orienting lines north and parallel with the maps blue vertical grid lines. Move the compass slowly over the area, keeping the orienting lines parallel with the maps grid lines. Where contour lines cross the edge of your compass at exactly 90 degrees is the slope you are likely on.

You can then use an altimeter to check your height and get a fix on where you are on the slope.

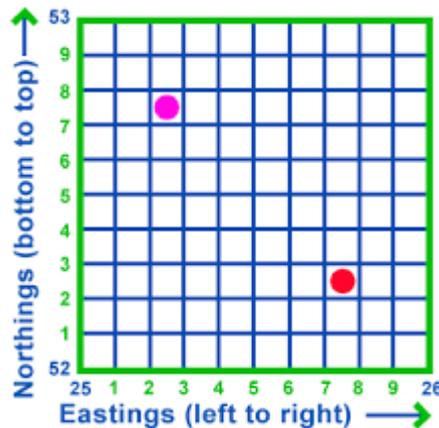
Reading a grid reference is a key skill in map reading and grid references define specific locations. By knowing a grid reference you can locate a place on the map and travel to or from it, accurately describe it to others, possibly for a rendezvous or to let the emergency services know exactly where you are if you are in trouble. They appear as a square grid, with grid lines numbered sequentially from the origin at the bottom left of the map and are numbered to provide a unique reference to an area on a map. It is very important to remember that a grid reference places you inside a grid square – this is not an absolute position.

The longer the grid reference the smaller this square becomes. On any metric 1:25000 scale map these areas are:

Grid reference	Example	Using	Boundary of area covered	Area described by the grid reference (m <sup>2</sup> )
4 figure	NT 54 16	Finger	1,000 x 1,000	1,000,000
6 figure	NT 540 162	Compass romers	100 x 100	10,000
8 figure	NT 5405 1623	Grid reference tool	10 x 10	100
10 figure	NT 54058 16239	GPS	1 x 1	1

A six figure grid reference places you in an area larger than a Wembley football pitch.

An eight figure grid reference puts you inside an area the size of a kitchen. Therefore always obtain the most accurate grid reference possible. When taking a grid reference an easy phrase to remember is along the corridor and up the stairs - this will keep you right with the correct direction to read off a grid reference.



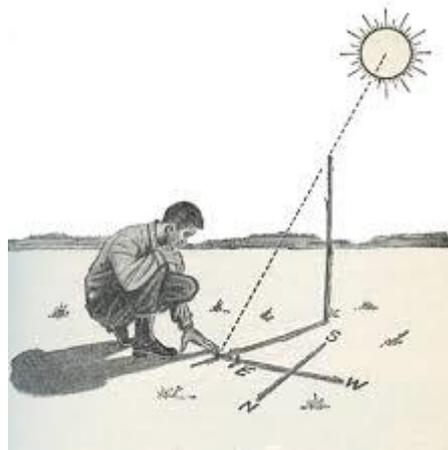
So if we were taking a six figure grid of the red dot it would be 257, 522 along the corridor and up the stairs. The purple dot would be 252, 527. If you were going to take an eight figure grid you would have to visually break the grid square into 10ths again.

The last part of navigation we are going to talk about is natural navigation, also known as celestial navigation. Celestial navigation was the first comprehensive direction finding system, used as long ago as 1200 BC by the Phoenicians to travel across the sea. So the first technique we are going to cover is finding

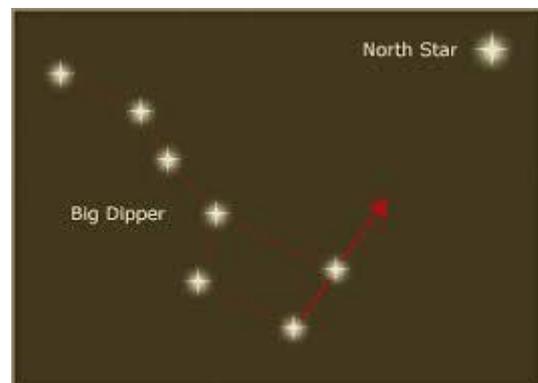


North/ South using an analogue watch. Point the hour hand directly at the sun. Bisect the angle between it and the 12 o clock mark. This direction is south in the Northern hemisphere. If you do not have an analogue watch you can draw an analogue watch set at the current time on a piece of paper and use that.

The next method we will cover is the shadow stick. The sun is always moving east to west, in both hemispheres, so the shadow moves from west to east. The first mark will always be west. Place a stick, walking pole etc, a minimum of 1 metre high into the ground. Mark the tip of its shadow - this will be the west marker. Wait a minimum of 20 mins and mark the new tip of the shadow - this will be east. Draw a line to join them together then finish it off by adding your North and South markers. The same system can be used at night if the moon is giving off a shadow.



To find the North Star you need to locate the big dipper which looks like a pan with a long handle. Once you have located the big dipper you want to look for the leading edge of it which is made up off two stars sometimes referred to as the pointer stars. Once located you want to draw an imaginary line 5 x the distance between the two pointer stars until you get to the next brightest star. This is the North Star.



That concludes the navigation phase of this hand out. We have covered the whole of PLAN- M in depth throughout this handout and I hope this serves as a

reminder to you of what you have learnt throughout your time with Backcountry Survival. Please stay on top of the skills you have learnt here, as practise is the key to success. Thank you very much for choosing Backcountry survival and we wish you all the best - stay safe. Please find attached some interesting bullet points about all elements of survival as a little something extra.

# SURVIVAL NOTES

- Coal Fungus, found attached to dead fallen trees, useful for catching a flame.
- Horses hoof fungus is also flammable.
- Split a stick down the middle and stuff it with birch bark, will make a brilliant signal torch.
- Birch Bark is flammable (good source of tinder) If the birch bark is dead or old scrap the surface and ignite the dust it leaves behind.
- Use a pencil sharpener to shave twigs to get wood shavings to start a fire.
- Seeds from thistle plants are great tinder as well.
- Bird feathers are flammable.
- Dead pine needles are excellent tinder for getting your fire started.
- Pine resin is a good source for fire starting can be found in a liquid form or solid. Once melted down it can be used to patch holes in tents and gortex, or to craft tools.
- Fat food (pine tree inner wood) very flammable use little shavings to ignite your fire.
- Pine branches over fire create a lot of smoke to use for signalling.
- Sandwich bags and straw in survival kit portable water bottle.
- Ringing moss out gives you instant drinking water.
- Dew on grass can be absorbed by clothes and ringed out for drinking water.
- Make a sieve by putting charcoal , sand and grass in a sock to filter water
- Pine cones are good kindling put them in at the beginning stage of building your fire.
- Use you space blanket as a heat reflector.
- The sun never travels across the north side of the sky, so you will not be able to signal for help at aircrafts approaching from the north.
- Rubbing crab apples over a wound will help to heal it.
- Pine resin can be uses as an antiseptic by adding water to the granules. Can gargle to combat mouth, tooth and throat infections.
- If you drink unclean water you run the risk of getting intestinal infections like dysentery and cholera.
- Leaves from the blackberry plant can also be used to help with intestinal problems.
- Brewing the flesh parts of rose hips and their leaves in water provide a mild constipation relief. The outer part of the rose hips contains a high amount of vitamin C.
- Dandelion tea is also a mild constipation relief.



- Do not eat snow and ice it will reduce your body temperature and your body will have to work overtime to process the cold water. Melt it first before drinking.
- Dock leaf contains a natural antihistamine chew it up and rub over a bite or sting to relieve the itching.
- Inner bark from a willow tree is good to relieve the symptoms of a cold or fever by chewing on it. It is also a good pain relief because it contains salicin which the body turns into salicylic acid which is the chemical precursor to aspirin.
- Cat tails found in wet land and pond etc, good to use for tinder for fire starting.
- Adding water to charcoal makes a make shift tooth paste because there are abrasive enough to clean your teeth.
- Body burns a lot of calories through the night so you are best to eat at night.
- Melting para cord can be used as glue or to patch holes in gortex etc.
- Sanitary towels can be used as a bandage; Tampons can be used to clog wounds.
- Duct tape over your metal mug stops you burning your lips.
- Tin foil over metal mug will help boil water faster.
- Tinfoil can be used to clean dirty mugs etc if rolled into a small ball.
- Bin bags in your survival kit.
- Duct tape can be used for cordage and to patch hole up etc.
- Birch can be used as roof tiles on your shelter.
- Space blanket can be used to reflect the sun away from you if it's too hot.
- Condom with water in it can be used as a magnifying glass to start a fire.
- A simple test of your physical capacity is to touch the thumb to the little finger of the same hand. The moment you have any difficulty in doing this you should light a fire.
- There are a number of different fire arrangements that produce the best ron There are fires for cooking, warming, drying, repelling insects, signalling and so on.
- If the fire is too hot, green fuel may be added or the air supply restricted.
- Quartzite stone makes a good flint.
- A natural stone, known as iron pyrite, may be used as a striker or both striker and flint. Two pieces of pyrite may be struck against each other to obtain an incendiary spark.



- True Tinder fungus found on living birch trees is easily identified as it appears already charred.
- Cedar trees good for fat wood.
- Douglas fir tree can be identified by the whiskers on the pine cone.
- Spruce tree has cones growing on the end; you can eat the bright green spruce needles.



- When using a stick for a peg etc, bevel the end to stop it from splitting.
- Apple mint, drives away ticks and fleas
- Tansy is stronger than apple mint at driving away ticks and fleas.
- A small depression in a pot hangar will help it stabilise.
- Bit of foam or a day sack backing to help give oxygen to the fire by fanning it.
- Natural tinder include old man's beard, pine resin, cedar bark, thistle heads, Douglas fir resin is best for tinder, birch bark, pine needles dry, cattails, dandelion heads and cramp balls.
- Horse shoe fungus has to be cut into small strips and dried to catch a spark.
- Hazel and sycamore are best to use for bow drill.
- Can use your mobile phone as a heliograph.
- Sun rises in the east and sets in the west.
- 3 stages of water purification are sedimentation, filtration and purification.
- When making a water filter, the bottom layer can be moss, grass, FFD bandage or cotton tshirt, mid layer can be fine gravel like in the bottom of river beds, top layer charcoal or large rocks.



57° 18' 40" N  
15° 02' 30" W

# SURVIVAL