PHYSIOLOGY OF MAN UNDER SURVIVAL STRESS

No matter what the circumstances, we can expect our bodies to react in specific ways to environmental stress. This section of the course will acquaint you with how your body will react when faced with heat stress, cold stress, and psychological stress.

Humans are mammals, we use our bodies to create the heat we need to go about our daily business. Our bodies need a constant internal temperature to survive. A difference in our internal temperature that you would not notice if it were present or absent in a cup of coffee is sufficient to kill you. A difference in internal temperature of 5-7 can be fatal. So your major requirement in any situation is to keep your internal temperature at or close to 99. That's it.

Heat Stress

The human body maintains its temperature under heat stress by sweating. Every droplet of sweat that evaporates on the skin dissipates about 200 calories of heat. Under severe conditions, humans can lose upwards of one quart of sweat per hour. (Well-acclimated persons will lose more, as their heat regulatory mechanisms are more efficient.) In a desert, where the humidity is low, and evaporation to the atmosphere is quick, you may not even be aware of this process, but you are losing water all the time. When the body has lost sufficient amounts of its water supplies to create an imbalance among the body chemicals called electrolytes, you will feel thirsty. This is your body's way of telling you to restore your fluid balance. You will lose approximately one liter of sweat before you ever feel thirsty, so you'll be a liter down from the onset of symptoms.

The body can lose approximately three liters of fluid before true dehydration sets in. Dehydration is characterized by loss of mental acuity, intense thirst, dizziness, and general body weakness. These are signals from your body that tell you to lie down and stop exercising (thus conserving water.) As fluid depletion becomes greater, the body simply shuts down further. Dizziness progresses to disorientation and hallucination, fatigue becomes lethargy and torpor, and weakness becomes coma and death.

Therefore, the one simple truth of desert operations is that you must maintain your fluid balance. There is no piece of equipment, no magic, nothing that will help you as much as an adequate supply of water. All of your efforts will be focused like a laser on either retaining your supply of water by acting in ways that minimize the need for your body to expend water to regulate its internal temperature, or procuring water.

As procuring water is an "iffy" proposition in a terrain noted for its aridity, we will first concentrate on keeping the water that you have. Most people who experience a survival episode are in a state of fluid imbalance when they discover themselves to be in trouble. So maintaining your fluid is critical. Looking around, you might think that there is little you can do to preserve your body's water supply. But there are simple steps you can take to minimize your water loss immediately:

1. SHUT YOUR MOUTH! Breath exhaled through the nose is partially stripped of water by the nasal passages. Breathing through your mouth exhales water at rate of approximately three times the rate of breathing through your nose.
2. GET OUT OF THE SUN! Even partial shade is far better than no shade. The more

protected your body is from the direct rays of the sun, the less heat stress you have to fight, the less heat you absorb from the atmosphere, the less you have to sweat, and the longer you last. Get into cover right away, and start building your microhabitat as soon as practical. You don't want to be moving around and building stuff during the hottest part of the day, but you can look around from your temporary shelter to see where a good microhabitat might be located. Then, when the sun is low, you can shift in and set up housekeeping.

3. SIT ON INSULATION! The ground in the desert is a giant heat sink. Rocks out in the sun can absorb enough heat energy to fry an egg. Even a small amount of insulation, such as a backpack or a jacket will spare you most of these effects. Get some insulation between your butt and the hot ground. Sit on a log, anything that gets you out of the sun and up off the hot soil is a benefit. (The Australian Special Air Service makes a practice of sitting in a hole dug at least 6" into the soil whenever they stop to rest in the desert. The dirt is app. 30 cooler 6" down. This may not work in all soils, however. The Aussies have a fairly uniform red dirt and sand mix that makes for pretty easy digging. Remember to balance energy expenditure against perceived gain.)
4. GET OUT OF THE WIND! This is how convection ovens work. Hot winds will strip you of water even more quickly than the sun alone. When you are siting your microhabitat, try to pick places that are out of the wind. Don't make it harder for yourself.
5. COVER YOUR SKIN! Your body doesn't care about the environment you find yourself in; it has no sensors to monitor what's going on a few feet from your body. It cares about the envelop of air that encloses your body. If you can maintain a dead air space around your body, then your body will only try to regulate the temperature and humidity of that space, instead of attempting to regulate the entire desert. Insulation works both ways. It will keep heat in and out equally well. That's why you can put cold drinks in a thermos bottle and have them stay cold in the same container you use to keep hot drinks hot.. Desert people such as the Bedouins wear more clothing than most Europeans, but it works for them because it guards them against direct exposure to the searing heat and temperatures of the Sahara Desert. Covering up will have the added advantage of protecting you against sunburn as well. Wear loose clothing (Remember you want a layer of dead air between your clothing and the skin) and cover every part of your body you can. Do not forget your face! Your have more sweat glands on your face and neck than anywhere else except your armpits, and they all work. A bandanna or loose head wrap will slow your water loss from the face and neck by about half. Wraparound sunglasses or tinted goggles will save your eyes from sun damage.
6. WEAR A HAT! Failing to wear a hat will cost you dearly in terms of water loss. A wide brimmed hat (at least 3") with some insulation power can save enormous amounts of water. If you can, get one with either a high crown or insulation in the top. Balding people need to be extra careful in their choice of hats. Good desert hats are made by Sequel, Tilley, and any number of cowboy hatters. Go all out and buy one with a chinstrap so that there is little chance of losing it in a wind. Colin Fletcher recounts a story about going with a National Park Service Ranger to

recover the body of a heat stress victim that is instructional. When they reached the dehydrated body, the old Ranger looked down and said, "No hat, no wonder." One old cowboy trick is to place a folded bandanna handkerchief in the crown of your hat. It provides some insulation, and you don't have to worry about being caught without a bandanna.

7. DON'T MOVE AROUND IF YOU DON'T HAVE TO. Moving around requires lots of water and energy, and you have only a finite amount of both. Get under cover right away. As time and temperature permits, you can move out and set up signals to rescuers, work on your microhabitat, and check out ways to get yourself oriented and found. Don't do this at noon, when you'll pay the highest price for your efforts, wait until just before dark, when it costs you less to make an effort.
8. IF YOU MUST MOVE, MOVE WHEN THE SUN IS LOW! Trudging through the desert in the heat of the day may make dramatic scenes for the movies, but it really stinks in real life. If you cannot move at night, restrict your movement to the twilight and dawn periods. When the sun is more than 15 above the horizon, hole up and wait.

The bottom line is your body is a water and energy bank. Don't overdraw it. Manage your water and energy budget wisely and you'll last a **lot** longer, whether you have carried water, found water, or are going without.

Of course, if you have some water with you, you are in much better shape. The more you have, the better life is going to be for you. This doesn't mean you can waste it doing dumb stuff like pouring it on your head to cool off, but you will last a lot longer with it than without it. How much longer? Well, the Army did a lot of studies prior to and during World War II on just that subject, and the guy who led the research compiled them after the war for publication. The book he published is called Physiology Of Man In The Desert by E.F. Adolph and Associates and it is very seriously out of print. But his life expectancy tables live on in a lot of different books. They are really sobering stuff, and I've reprinted them here for you.

See how much difference a couple of quarts makes! See how badly walking out starts to sound if you haven't got a lot of water! Enough said.

NO WALKING AT ALL

Max. Daily Shade Temp. °F	Available Water per Man, U.S. Quarts: 0	1	2	4	10	20
	Days of Expected Survival					
120°	2	2	2	2.5	3	4.5
110°	3	3	3.5	4	5	7
100°	5	5.5	6	7	9.5	13.5
90°	7	8	9	10.5	15	23
80°	9	10	11	13	19	29
70°	10	11	12	14	20.5	32
60°	10	11	12	14	21	32
50°	10	11	12	14.5	21	32

WALKING AT NIGHT UNTIL EXHAUSTED AND RESTING THEREAFTER

Max. Daily Shade Temp. °F	Available Water per Man, U.S. Quarts: 0	1	2	4	10
	Days of Expected Survival				
120°	1	2	2	2.5	3
110°	2	2	2.5	3	3.5
100°	3	3.5	3.5	4.5	5.5
90°	5	5.5	5.5	6.5	8
80°	7	7.5	8	9.5	11.5
70°	7.5	8	9	10.5	13.5
60°	8	8.5	9	11	14
50°	8	8.5	9	11	14

(From PHYSIOLOGY OF MAN IN THE DESERT, E. F. Adolph and Associates, 1947)

Cold Stress

Unfortunately, heat isn't the only stressor you will be faced with in desert

environments. We have already seen that many of the biomes of the Arizona Sonora Desert are fairly cool, and depending on the season some mountainous biomes can support a ski resort. The other, hotter, biomes also have periods during the night when they lose enough heat to stress the body and deplete its resources. The temperature differential in the Arizona Sonora Desert from the highest daylight temperature to the lowest nighttime temperature can be as much as 50 F.

Just as your body cannot take a lot of heat, it also can't take a lot of cold. Once your skin temperature reaches about 90 F., the body starts manufacturing heat. The method that the body uses is shivering, a process in which subcutaneous muscles contract and relax violently. This generates heat, but quickly exhausts those muscles, and uses up the body's energy stores. If the cooling of the body is not stopped, hypothermia will result.

How do you avoid being cooled down and depleting your body's energy reserves? Use the desert to insulate you against heat loss. Remember, we are still talking about that ¼" layer of air that is in contact with your skin. Your task is to keep that layer warm and undisturbed, just as it was your task to keep it cool and undisturbed during the day. Most of the techniques you will use are very similar or the same as those you used to stay cool, as we are dealing with environmental stresses on the body in both cases. Lets start with:

1. GET OUT OF THE COLD – The air temperature outside your little microhabitat may be falling like a rock, but if you are in a snug little microhabitat, the air around you will be much warmer. In measurement tests last year, the air temperature at the center of a jojoba bush was an average of 25 cooler during the day and 25 warmer at night than the atmosphere outside of the same bush. How? The insulative properties of the leaves buffered the effects of the sun and the nighttime temperature drops. Air you don't have to heat and cool is air you don't expend energy upon. It's that simple. If you have brought any survival gear, space blankets, trash bags, now is the time to use it.
2. GET OUT OF THE WIND! – This goes with the tip above. The wind is continually replacing the air around your body and causing you to spend more energy keeping your skin warm. Get out of it.
3. INSULATE YOURSELF! – The ultimate insulative material we've found do far is goose down. All it does is keep wind and low temperatures from stripping away the heat from that boundary air layer over your skin. While they are admittedly way less comfortable than goose down, dead leaves, pine duff, dry grasses and other field expedient materials perform exactly the same job. Use materials you find around you to build a nest inside your microhabitat and you'll be able to sit out some pretty ferocious weather. Sit on your gear or pile insulative materials on the ground underneath you to avoid losing heat to the ground through conduction.
4. STAY DRY! – Everything that happens when you're dry, in terms of heat loss, happens much faster if you are wet. Getting dry and staying dry is an absolute priority in survival. Water is what you drink not what you wear.
5. DON'T MOVE AROUND IF YOU DON'T HAVE TO. Moving around requires lots of water and energy, and you have only a finite amount of both. Stay put in your nest during periods of cold stress.
6. WARM UP BEFORE YOU FREEZE UP! – You can scavenge a lot of heat

before the desert cools down by basking on rocks like a lizard. Be careful that you don't lose a lot of moisture doing this, but absorbing heat from warm areas during the period of dusk and twilight is a good strategy. When dawn comes after a night out, get out & warm up, then get back into your "hide".

Hyponatremia

Hyponatremia is a fancy word for drinking so much water it makes you sick. Normally having that much water is a great problem to have in a desert survival situation. It is possible, though, to have too much of a good thing. Hyponatremia is a problem we largely created by giving hikers good advice. For years, there was a school of thought that said that you should conserve your water in a survival situation. This led to several deaths when folks conserved their water so well that they died with full canteens next to them. The methodology then shifted to telling folks to consume their water supplies and stave off dehydration. That has proven to work too well where fairly plentiful water supplies exist in a desert environment. Some folks have taken this to such extremes that they have bloated up like ticks, and totally thrown off their electrolyte balance. This is hyponatremia, literally "water poisoning".

As this is a manufactured disease, it has a natural solution. Consume water supplies as you need them, no more or less. Drink your water when you are in need of them, and don't "camel up". You are not a camel, and you can get in trouble if you overuse anything.

Emotional Stress

If you want any recipe for survival to go bad, just add adrenaline. People who function really well when they are not under stress can go way over to The Dark Side when their hearts are going a mile a minute. Your body's reaction to stress is an ingrained process that dates all the way back to when we scuffed our knuckles on the ground when we walked. In physiological terms, your thinking processes get "hijacked" by your emotional process, and impulses that would be normally routed through your cerebral cortex, the rational part of your brain, instead go directly to your amiglyda, the old "fight or flight" lizard part of your brain. This helpful little section of your gray matter prepares you for an extended problem in which lots of hopefully rational decisions will need to be made by pumping you full of adrenaline and making it hard for you to think at all.

All of this leads to a set of feelings that you will have to deal with before you can successfully think your way out of any survival situation; these are (pretty much in order) fear, anxiety, loneliness, anger, boredom, and hopelessness. The Air Force ran a long series of tests at its Pilot Survival Schools, and found that these emotions pop up continually among the lost. Every person interviewed after a survival situation experienced some of these emotions, and most experienced them all at one time or another.

Luckily, there is a method for unscrewing your mind and getting focused on the task of survival. I call it "The Dao (Or Way) of Survival".

The U.S. Military has been running survival, escape, and evasion schools for its personnel since the Korean War. During that time they have identified many useful tips for

survival in any climate or situation. They have also come to some interesting conclusions about who will survive and who will not in any given situation.

Based on over fifty years of study, the military has focused upon, identified, and now teaches a particular way of looking at survival that allows even the most ill equipped person a significantly greater chance of both avoiding being caught in a survival scenario and of surviving if they are so challenged.

This "Dao of Survival" is no more or less than a learned mind set that enables the user to calm themselves down, inventory what they have to work with, accept what they cannot change, and get on with the business of managing their lives until they are either found and rescued, or reach friendly lines on their own.

People tend to think about things in two ways. A way to go about visualizing this is to picture two large circles that are placed side by side. The circle on the right would be labeled "What Happened." In it people mentally put their descriptions of things that happened exactly as they occurred, such as "A rock fell from the cliff." The second circle is labeled "What we say what happened means." In the case of the falling rock, this might be, "There's someone up there." Where we get in trouble is when we act as though what we say what happened means is what actually happened. This leads to fear, paranoia, and all kinds of other stuff that we specifically don't need in a survival situation.

To put this simply, "I don't know where I am now." does not mean, "I'm going to die." And if we act as though it does, we make our problems much worse. The last thing you need when you are lost or stranded is to imagine a lot of stuff that isn't even real stuff, but rather is a story you've made up about what really happened, and then act as though the story was true. After all, "I don't know where I am now." may mean that "Now I finally get the chance to put all this nifty gear and knowledge I've accumulated into practice!" What a great opportunity!

So, how do you get out of this mental trap? First, you recognize the trap is there. Then concentrate on stating to yourself what has actually happened. These are the facts that you will have to deal with. Be objective and calm. If you have to control yourself, sit down someplace quiet and shady, like under a tree, and compose yourself before you do anything. As the emergency medical people say, "First, check your own pulse!" Calm down before you take any action. Once you are calm, you are ready to think about what's going on. Until you are calm, you are very likely to make things much worse for yourself.

After your pulse is back to normal, take a good look around you. Contrary to popular myth, people do not simply "get" lost. Rather, they go from being "found" to being "lost". I can assure you that everyone has been disoriented at one point in time or another, and almost all of us have worked our way through it, gotten ourselves "found" again, and gone on with our business.

So your first order of business is to **OBSERVE.** Mentally describe to yourself what you see around you, what terrain you are in, are there any clues to how you got untracked, is there good shelter nearby. The value of a good look around cannot be underestimated. Nine times out of ten, a good look around will give you the clues you need to get yourself located.

Second, you will want to **ORIENT** yourself to your surroundings. Information is useless if you don't process it and use it. The stuff you saw in the observation step has a lot to tell you about where you are, and is critical if you are to decide what you're going

to do. This step has the effect of composing you and locating you in the specific "space" you inhabit at this minute. As you perform the Orientation step, you will feel nervousness and unfamiliarity going away. When you are calm, know where you are, and are reoriented, it is time for the next step.

DECIDE! This is where you will take that critical step that will shape your future. This often boils down to the question of "Do I stay or do I go?" Critical factors in the decision to stay or go are:

1. When I got calmed down, did I have clue about where I was?
2. Is there someone out there who knows where I am?
3. How long will it be before I am missed?
4. What resources do I have?
5. Do the people who will miss me know what to do? Are they reliable?
6. What do I have to work with to either enhance or maintain myself where I am?
7. Do I **know** of a place within my reach that has more, better stuff?
8. Can I get there without expending an inordinate amount of my resources?
9. Etc., Etc., Etc.

You will want to make these decisions and cogitations when you are as calm and have as much information as possible. After all, you may be betting your life on the results.

(You may, of course, make incremental decisions, such as, "I'll climb up to that knoll and look around, then decide what to do." The key factor is to make the decisions as part of a process, rather than haphazardly.)

Finally, you must **ACT.** Put your plan into effect. Remember, the decision to stay where you are and await rescue is an action too. Commit to your action plan until you come to a milestone that tells you it's time to rethink it. For instance, if you were going to backtrack for ½ hour and see if you can cut the trail you were on, after ½ hour, you need to go through your OODA loop again.

This process will be repeated as many times as you need to do it, until you get found, find yourself, or die. The key is to have a set method of looking at your situation, to use that method, and to remain in a state of inquiry, rather than giving way to fear. As the Zen master once said, "Wherever you go, there you are." If you think of where you are as a series of experiences that, although they may be unpleasant, are survivable, you are well on the way to being in the frame of mind necessary for not only survival in, but appreciation of the magnificent resources that the Arizona Sonora Desert provides.

THE MICROHABITAT SURVIVAL METHOD

If you ask someone on the street where they live, you might get an answer like, "The United Sates of America", or "Tucson". If you ask an ecologist the same question the answer might be, "in the Arizona-Sonora Desert". To scientists, we live in a **habitat**.

As a matter of fact, a habitat is defined as *"the locality in which a plant or animal naturally grows or lives."* For my teenage daughter, that would be the mall. For a

cottontail rabbit that would be about 100 meters from where it happens to be sitting at any moment, and for a bark scorpion, it might be a specific rotting saguaro.

Animals have their habitats defined by their **range**, the distance that they normally travel during their efforts to survive. That's what we're really doing when we describe ourselves as Tucsonans, or Arizonans, or Americans. We're defining our range. A jet lagged vice president of AOL would define himself mostly as an American, because his range includes travel to foreign countries. On the other hand, we all know folks who get nervous when they leave Tucson for a rare visit to the exotic lands of Phoenix. They would define themselves as Tucsonans, although their range might include strange locales such as Green Valley and RanchoVistoso.

The point is that we define ourselves, as do the ecologists, by our habitat and range. These definitions are like a series of concentric circles that grow smaller and smaller, eventually pinpointing our desired location. We are comfortable within our habitats, and we know how to behave to maximize our survival.

When we are lost, we are by definition outside of our preferred habitat, although we may well be inside of our range. We have trouble locating those things we need to survive. That's why we hear stories of people dying within sight of food, water, and shelter. They died because the forms that food, water, and shelter took in their normal habitats were different from the one they found themselves in, and were therefore unrecognizable to them and unusable.

What you will learn in this section of the course is how to identify or construct a habitat that will support you. We will take the smallest circle, identify what your needs are to survive in this tiny, or **micro**habitat. Let's start with a simple exercise. Stand up and hold your arms out to the sides as far as you can. Now turn in a circle. This is really where you live. This is your microhabitat. Everything that happens within this space happens immediately to you. You are continually modifying this space to enhance your nutritional, shelter, and other needs. These are called physiological needs.

A physiological need is one that is designed to take care of a need of the body.

Our bodies are mammalian; we need to keep them at a more or less constant temperature, and we can use the heating and cooling mechanisms built into our bodies to do this. Since we have an extended range, it is impractical for us to keep our microhabitat at a constant temperature. So we invented modifiers that allow us to cope with an extended range of temperatures while keeping our bodies at a constant temperature. We call them **clothes**. Imagine for a moment that you had no clothing on. Would the room seem hot or cold to you? As you are in a dwelling designed for humans who are wearing clothing, it might seem a little chilly, but you could probably survive in it as long as no one turned off the heat. What if there was no heating system in the building? Then, in a very short time, your body would begin to manufacture heat in order to keep itself in a functional temperature range. It would do this by initiating the process we know as shivering. When we shiver, we contract muscles to create not movement, but heat. This process continues

until either the body temperature is at the desired level, the food supplies to the muscles are exhausted, or the muscles are too fatigued to continue. Obviously, we can't keep this up long. Clothing is the first answer to physiological stress that our Paleolithic ancestors invented.

The second was shelter. Imagine you and your little naked microhabitat are now transported into Sabino Canyon. Would the effect of the environment on your personal space be greater or lesser? I think we can agree that you would have a better chance of managing your temperature inside than outside, even without a heating system. Basically, the smaller the area that you have to deal with, the easier it is to get it the way that you need it. A house is smaller than a canyon, so you have a better chance of using your finite resources to achieve survival in a house.

In a survival setting, the first thing you will learn to do is to take care of your physiological needs. You need to do a few things very fast and very well. In order, you need to maintain your body temperature and secure food and water resources. If there are no food and water resources available, you need to make those that you have last as long as possible. Placing yourself in the most favorable microhabitat within your range, or constructing a microhabitat if there is not a favorable habitat within reasonable range achieves all these objectives.

So, how do you go about this effort? You start by looking around for what you will need most. In most habitats, that is shelter. Unfortunately the world outdoors is usually too hot, too cold or too changeable to allow you to keep your body temperature within its ideal range. Therefore you will need to inhabit a space that you can keep within your ideal range. This is a shelter, or microhabitat.

Obviously the degree to which you will have to devote resources depends upon what you've got to work with, how great your needs are, and where you are. The types of microhabitats you will need to inhabit will vary greatly depending upon what the characteristics of the biome, or macrohabitat, that you are in require of you. But lets consider, for the purposes of this exercise, that you are adequately dressed for a daylight hike in warm (85 F.) weather in the Thornscrub biome. Now let's suppose that you become hopelessly lost. Being of sound mind as well as sound body, you have told someone that you will be hiking up Pima Canyon, and have actually **gone** up Pima Canyon for about five miles. Then, somehow, you got turned around, lost the trail, and after an hour of searching are disoriented, tired, and confused. Oh yeah, your water is gone and you have an hour of daylight left. What to do?

As night will soon be coming, and you have insufficient clothing to withstand the 30-40 F. temperature drop that this will bring, shelter sounds like a dandy idea. So you look around the open riparian area in which you are located for a shelter that will serve as an overnight hotel until you can be found. But what are you looking for?

Well, the exact nature of your microhabitat will vary with the terrain and your location, but there are some general guidelines that are available But some general information can't hurt. First you want to find or make a microhabitat that will allow you to maintain your current body heat while using as little of your resources as possible. This is done through insulation, or rather by creating a dead

air space around you. That's why Paleolithic men and women lodged in caves. They offered shelter from the elements, which otherwise are working full time to either elevate or lower your body temperature. Piling up and burrowing into pine duff, getting into the center of a dense bush, such as a jojoba or manzanita, sheltering behind a rock wall, all of these methods have the effect of lowering your exposure to the elements and raising your chances of survival. Out in the open, your body will have the challenge of heating or cooling the entire atmosphere that surrounds you, and this is a challenge that it will very quickly lose. So seek or construct shelter immediately. And remember that the smaller and snugger your shelter is, the less of your body heat and perspiration will be used to heat and cool it.

Another thing that should be avoided is the urge to build elaborate shelters. You have a limited supply of energy, water, and body heat. When those are expended, you're done! Look around before you begin construction of what may turn out to be an fancy tomb. Is there something available that will do 90% of the same job for 10% of the effort? Now is the time when creativity and the ability to think of things outside of the way that they normally appear for you pays huge dividends. For example, a cluster of creosote bushes growing close together can be intertwined and covered with leafy brush to form a *jacale,* a form of shelter used by both Papago and Apache Indians in low desert habitats.

One final note, if you find the perfect little microhabitat for yourself, it in all probability is already inhabited, or soon will be, by something that shares your needs. I have spent some time communing with a coyote as we both waited out a rain shower in the Rincons inside a manzanita bush and we did not get on each other's nerves. After the rain, she merely looked at me and left. Other critters, such as snakes, may need to be dislodged or evicted to keep from having accidents occur. (By the way, the Army Ranger mindset in which snakes are referred to as "Meals Without Wheels" only works for you if you are prepared to go way outside of your normal food range and are trained in obtaining reptiles as food. This particularly applies to venomous snakes, the easiest kind to catch. Military types are bitten during their "eat off the land" courses at an astonishing rate.)

There, you're all set. Inside your snug little microhabitat, you will avoid the worst of the sun's heat during the day, and the worst of the cold at night. You will have extended your supplies of energy and water, and bought yourself time to be found in. Not bad for a few minutes work.

THE BASIC SURVIVAL KIT REVISITED

In my military days, I had the great fortune to work with Col. James "Nick" Rowe on the development of a personal survival kit. He had one rule. If it wasn't something that you would carry every day of your life, forget it. His reasoning was that no one ever prepared to have a disaster. At the moment of disaster, all you had was what was available to you at the moment. So a small survival kit should be carried at all times and supplemented with progressively larger kits as one's overall risk increased. The original kit we came up with fit into a cigar box and weighed in at about 2 pounds, without counting his big old folding knife.

Well, times have changed, gear has gotten better and lighter, and it was time to revisit this kit. I enlisted the help of Walter Pickett from the Southern Arizona Rescue Association and went back to the basic design with the intent of performing a major upgrade. Here's what we came up with for a daily carry kit. All of this stuff fits in a container that is belt mounted, unobtrusive, and weighs in at less than 1 ¼ pounds.

ITEM	MY COST	MINIMIUM COST
Belt mounted Riggers pouch	$12	$12
4" Fixed bladed knife	$200	$5
Magnesium firestarter rod	$3	$3
Whistle	$2	$2
Emergency blanket	$3	$3
Butane lighter	$.50	$.50
Sharpening stone	$5	$1
Pulsar Microlight	$7	$4
3" * 4" glass survival mirror	$10	$10
Mini Cyalume light stick	$1	$1
Medication Container (Old MiniMag Light)	$0	$0 (scrounge!)
Water purification tablets (20)	$2.50	$2.50
Medications	$10	$10
50' dental floss	$1	$1
Sail maker's needle & Darning needle	$.75	$.75
Ranger bands (2)	Free	Free
Tinder	Free	Free
Condoms, unlubricated (2)	$2	$2
Paracord (5')	$.50	$.50
Split shot (4)	$.05	$.05

Fishhooks (2)	$1.50	$1.50
10# fish line (100')	$.25	$.25
5' of duct tape	$.25	$.25
Pen	$.50	$.50
Compass	$2.50	$2.50
Butterfly bandages (3)	$.50	$.50
TOTAL (ROUNDED TO NEAREST $)	**$263**	**$62**

In terms of cost, my kit is quite expensive, as I'm addicted to really good knives. But then, I'm worth it! Substitutions can easily be made to lower the total cost of the kit substantially, but let's just work with what we have listed to determine the present dollar value of this kit, as well as the dollar cost of a low cost equivalent kit.

Of course, anything else that is about your person would be added to this kit. (This is where that fancy watch with the compass and the altimeter comes into its own.) The stuff in your wallet, pocket litter, clothing, everything you have with you when you find yourself in a survival situation has meaning and utility toward keeping you alive and getting you either unlost yourself or found by someone else.

Nevertheless, this kit is small enough to carry with you any time you leave home, and has enough gear to sustain you in the field for a reasonable period of time if you know how to use the stuff. It also has the added value of being relatively unobtrusive, so you won't be answering any of those dreaded "Whuffo" questions (Like, "Whuffo you carrying that big ole knife, boy?") This means that you **will** carry it. And that means that you will have it when you need it. Remember, no one ever walked out his front door thinking that today was a good day to get lost and possibly die in the woods. You will **encounter a survival situation when it is unexpected and a small package of preparedness** can make a big difference.

So, now that we've talked about why you want to carry the kit at all, let's discuss why each of the ingredients is in the kit:

1. The rigger's pouch – This is pretty simple. You need a holder for all this stuff. It should carry all of the contents of the kit and be rugged and small enough to sit on your belt or in your pack without either being conspicuous or bulky. The rigger's pouch does that. They are available at police supply and surplus stores nationwide, fasten to your belt with Velcro (if you wish), and look like nothing more than a really fat cell phone case. I had mine modified by removing the belt loop Velcro and turning the webbing it was on doubled down to form a solid belt loop for extra security, but that's really optional.
2. 4" fixed bladed knife – If you got all of the "survival experts" together and asked them for the one thing that they absolutely require in a survival situation, the majority would opt for a good knife. The usual controversy would erupt next about blade types, lengths, and whether to carry a folder or a fixed blade, but the

bottom line would still be a knife. I chose a 4", fixed blade knife for my kit for several reasons. First, I could slip a fixed blade in a much smaller space in the kit than a folder and the protruding handle wasn't going to be a problem or cause controversy where I live. (It helps that the round, knurled handle looks like the handle of a tool or baton rather than a knife, too.) Second, the knife I chose to carry, a Chris Reeve hollow handle tanto, allowed a few more things to be carried without sacrificing the strength of the knife. Mr. Reeve cuts his knives from a single bar of A2 steel, so there is no weak point at the point where the blade attaches to the handle, as there is with other types of hollow handle knives. Third, it's a little thing. It's hard to find a small survival knife. For some reason, cutlers seem to make them all the size of tire tools, and carrying a dirty great sword around will get you a lot of unnecessary attention in most communities. A 4" blade will get any cutting job done that you require. If you need to down a tree, use a saw. The drawback, of course, is that one of Mr. Reeve's knives costs about $200. (If you want a lower investment, there are a lot of small fixed blade "bird and trout" type knives out there that will fill the bill. Just look for one that's pretty sturdy. One of my friends uses a big paring knife with a black molded plastic handle that he says works fine.)

3. Magnesium Fire Starter Rod - I don't care if you are bailing out over Siberia or lost in the Arizona Desert, at some point, you need the ability to make a fire. Murphy has decreed however that when one is lost, all locally obtained fire-making materials will either be wet or too big catch well with the few lights that you have. A magnesium fire-starting rod will fix this. You can use your knife to shave bits from the rod and make a starter that will get wet or poor tinder going with ease. The striker on the side can also be used to strike very hot sparks into tinder and get a fire going. They are small, light weight, and slip into the pocket on the rigger's pouch that normally holds a pen (Remove the handle.)
4. Whistle - Getting found often means making noise. Shouting and screaming uses up a lot of energy. Using a whistle uses very little energy. A small survival whistle is cheap and takes up very little space. Try to find a flat bodied one as it packs better. (I'm told that dual tones are better than single toned whistles at getting attention, but have yet to see any field trial data to support this contention. For me the operating principle of whistle effectiveness is loudness.)
5. Emergency Survival Blanket - Next to the "getting found" type of survival needs, shelter will be your biggest challenge. People have to maintain their body temperature within a 5 range or they go all goofy from either hyperthermia or hypothermia. We use energy to do this, and energy is one of the things that is in short supply in a survival situation. The emergency survival blanket is the largest single item in my survival kit, but one of the most important. It can be used as a sun shelter to give you shade and preserve your water supplies. You can rig it as a water catcher and supplement your fresh water supplies if you get rained on. You can wrap yourself like a burrito and avoid cooling out during the night. It makes an excellent signal panel to let folks know where you are. The list of stuff you can do with one of these blankets is worth a course in itself. It will take a little cramming to get it in, but it's worth it! (A cute trick I recently learned is to take a Magic

Marker and write HELP on the foil side in large block letters. Hey, it might help.)

6. Butane Lighter - In the good old days, every survival kit came with a supply of waterproof lifeboat matches. These matches were mixed with an extra shot of phosphorus to ensure that they didn't go out until they were consumed and then dipped in first wax, and later in plastic to keep them waterproof. More modern kits use a portable butane lighter to serve the same function. This lighter should be packed into the center of your kit, as the almost unbreakable container for the butane can be broken if you try hard enough. You should also get one with a "child proof" ignition to avoid having something in your pack depress the little plunger and release the gas, leaving you in trouble when you need it. Further, you should change it out or at least check it every year or so during your annual maintenance check of the kit. If this sounds like a lot of work, make up a little package of lifeboat matches, stick them in, and forget it. But if you opt for the lighter, you'll get over a thousand lights instead of 15 or so, a variable flame, and greater control over how long the flame lasts per light. To my mind these are sufficient advantages to tip the scales to the lighter.
7. Sharpening Hone - There are people in this world that can sharpen a knife on a handy rock. I'm not one of them. If you are one of these folks, you can omit the hone. You cannot omit the need for a sharp cutting tool in a survival situation. I believe that a small hone is vital in any kit that I carry. The hone I have now is a small, lightweight diamond hone in a medium grade. It slips in behind the lighter and protects one side of the lighter case while the whistle protects the other side.
8. Pulsar Microlight - When I started the survival game, the light of choice was a big two D cell Army crookneck flashlight that weighed more than my whole kit does now. Then all of the operators switched to progressively smaller versions of the Mag-Light, whose aluminum bodies and halogen bulbs redefined what a flashlight could do. As a matter of fact, the Mini-Maglight in it's AA battery form so redefined the flashlight that it has become the size standard for web equipment. You can hardly purchase a belt pouch that isn't sized for a Mini-Maglight. Nevertheless, time has moved on, and another new technology has emerged to challenge the dominance of the Maglight. This new wonder is Light Emitting Diode Technology, or LED for short. The miniscule power requirements of the LED bulbs allow a flashlight to occupy a tiny space and the Pulsar Microlight occupies less space than any other flashlight I know. It's a teensy little thing that uses a watch battery to power its one LED bulb. To operate it you just squeeze the side and the little bulb produces a surprising amount of light. I use one with a side mounted off-on switch so that something won't press against it and deplete the battery. It's kind of a luxury in a survival kit, but at less than an ounce, what the heck. It might save you trouble setting up camp on a wet or cold night and will certainly make starting that first crucial fire in the dark much easier.
9. Glass Signal Mirror - If the flashlight is an example of technology transforming and improving equipment, then the glass survival mirror is an argument for the tried and time tested past. First used militarily during the Napoleonic Wars, the signal mirror remains the best method to get attention in any situation where you have access to the sun. (I've even seen one used in a cave, with a flashlight as the light

source.) A good signal mirror allows you to focus and redirect a light source to a spot you choose, providing a dandy method to get attention or send signals. The range of a signal mirror is astonishing, as is its attention getting properties. The mirror in this kit is a 2" * 3" surplus tempered glass mirror. It has a sighting hole in the center, and clear directions for use printed on the back. There have been many attempts to improve on the glass signal mirror, but none of them have been successful. Every stainless steel or plastic signal mirror I have tried has been vastly inferior to the glass mirror. The bigger the mirror, the better it attracts attention.

10. Mini-Cyalume Light Stick – If there is one thing in my kit that I'm still not rock solid on, this is it. But it's so cute that I keep it around just hoping for a chance to prove or disprove its worth. As every parent knows, a Cyalume stick is a chemical filled plastic tube that when bent 90 mixes two chemicals that glow for a period of time. You then tie one of them to your kids who are going trick or treating and it's harder for them to get lost on you. They come in various degrees of glow, lengths of time they last, and sizes. The tiny little guy I've got in my kit is found in dive shops, where it's used to track divers on night dives. It's good for about two hours of light. I understand that the best use of this little feller is to attach it to about 5 feet of dental floss and whirl it in a circle when an aircraft is about. I know that the bigger sizes work pretty well as a trail-locating device for Search & Rescue. If this sounds like a lukewarm endorsement, it is. After I try out these things a few more times, I may be more enthusiastic. For now, it's in my kit on sufferance.
11. Medication Container – Remember a few items back when I was talking about how hard it was to find a pouch that isn't sized for a MiniMag Flashlight? Well, my riggers pouch has a sleeve for one also. I fretted and fumed for weeks trying to think of some way to stick something in there that would pay its way, but the only thing that sleeve holds well is a MiniMag. Finally, I decided to make a virtue out of necessity and just stuck a highly modified MiniMag in the sleeve. You see, while the MiniMag may be passé as survival light, it's still a beautifully machined, waterproof container. It's sturdy aluminum and can take a lot of abuse before its contents are damaged. This makes it perfect for storing medications and suchlike that would not survive packing into the survival pouch and need to be kept dry. I unscrew the lens on the top of the light, remove the bulb, and pack about twenty water purification tablets in this space. (I use some Superglue to make absolutely sure that the plastic lens has a waterproof seal to its aluminum ferrule.) The little plastic reflector keeps them separated from the battery compartment, which I fill with personal medications and a supply of needles. Use a little cotton wool to pack everything in so the pills don't get crushed rattling around. The head and end cap are O-ring sealed to the barrel of the MiniMag, so you have a waterproof compartment. Pretty nifty, if I do say so myself. An added advantage is that the MiniMag works as camouflage to disguise the kit as it sits on your belt. You see, every working stiff and mechanic in the civilized world has some kind of pouch on his belt with a MagLight sticking out of it. If you have one too, it's automatically a tool kit to 99.44 % of the population. In other words, it's familiar enough so that it disappears from consciousness and you don't have to put up with questions about what you're wearing, or why. I have worn my kit into places where a sheath knife

would have stood out like crazy and no one has batted an eye, even with the handle of the fixed blade knife sticking out of it. I guess they assumed that it was some kind of screwdriver. NOTE: I am no way advocating that you test out this theory by hauling a knife into entirely inappropriate places just to see if you'll get busted! I can think of no better way to find yourself splayed out over the hood of a police cruiser while the nice officer tries to see if his pistol muzzle will fit into your ear canal than to haul a blade into a jail, bar, or polling place. Don't even go there!

12. Water Treatment Pills – There are basically three ways to treat water; filter it, chemically purify it, and boil it. Any form of filtration device is too large, or too ineffective to place in a belt mounted survival kit. You can pretty much assume these days that any water source you might find is in some way contaminated. Another good assumption is that you are going to need any water you come across. As filtration is out, and boiling requires some form of fireproof container, we're going to fall back on the iodine pill to purify water. These pills will make your water taste really bad, but they'll kill almost all of the active bugs that may be in it. They are sold in sports stores in little brown bottles for about $5 for a 40-pill bottle. You can, as I said before, get about twenty of them in the lens section of the MiniMag. This will purify a lot of water.
13. Personal Medications – If you are taking anything for something, you need a small amount of it with you when you are unable to access your steady supply. This is really a survival issue that you carry around with you at all times. The inner tube of the MagLite provides a good container for whatever prescription medications you have to keep with you. Just remember to rotate these medicines regularly so that they don't lose their potency. Again, use cotton wool to pack them in so that they don't rattle around and break down on you. For those of you who don't have any personal medications, fill it with medications and equipment that will help you in the bush. A few suggestions are:
    a. A broad spectrum antibiotic – such as Tetracycline
    b. A small squeeze tube of wound dressing – such as Neosporin
    c. A pain killer - aspirin (or aspirin w/ codeine if your doctor will let you have it)
    d. Electrolyte replenishment pills
    e. A couple of butterfly bandages
    f. A suture kit
    g. An anti-diarrhea medicine – such as Lomotil
14. 50' Dental Floss – There are few things in life with as many uses as dental floss. It is strong, light, holds knots well, and packs into a very small footprint. I have used it for lashing poles together, stitching the sole back on a boot, sewing up a ripped tent, emergency fishing line, making game snares, and cleaning my teeth. Fifty feet of floss, taken out of the container and crammed in the bottom of the mirror pouch, simply disappears until you need it.
15. Sailmaker's Needle and Darning Needle – I'll do the two of these together as they serve the same function. One of the first tools that is made by any primitive society is the needle, and for good reason. If you need to sew anything up or together, you need a needle. Given their very light weight, there is no good reason not to stick

needles into your kit, the darning needle for cloth and flesh, and the sailmaker's needle for heavy work. Slide them into your MagLight with the personal medications (Point down!) and forget them until you need them. I have only used a needle once in a survival scenario, to stitch a boot together that had lost its sole, but that one use saved me a very bad time, as I was a very long way from home.

16. Ranger Bands – Next to duct tape, the Ranger Band is probably the most frequently used emergency fastener our military has devised. For those of you who haven't had the sheer joy of going to the Army's Ranger School and don't know what I'm talking about, a Ranger Band is a piece cut out of a kid's bicycle tire tube crosswise so it form a big fat rubber band. You can buy them commercially at various surplus and military supply stores, but the best way to get a lifetime supply is to go down to your local bike store and ask them for a used mountain bike tube. Set it on your workbench and cut 1" salami slices out of it. (Throw away any slices with holes or tears.) Pretty soon, you'll have a nice pile of Ranger Bands. Slip a couple of them on the tongue of the Rigger's Pouch and slide them up past the Velcro. There, all done. You can use these for any kind of fastening you may want to take apart again, but where they really shine is in lashing poles together to form shelters.
17. Tinder – Remember that cotton wool you used to keep the pills from rattling? It's tinder. Tinder is nothing more than finely shredded vegetable fiber that you use to supplement your magnesium firestarter to get a fire going. A really great tinder is the stuff in those firestarter blocks that they sell at outdoor stores. Take one of them and pound on it until it loses its form and solidity, then stuff some of it into the handle of your knife, or the bulb well of the MagLight if you don't have a hollow knife handle. (Wrap it in Saran Wrap so it doesn't mess up your medicine.) If it's raining and your firewood is wet, tinder (and that handy magnesium firestarter) can make the difference between a miserable experience and a happy one.
18. Condoms (Unlubricated) – A lot of the art of survival is creative visualization. That is, seeing the possible uses of a thing rather than its intended use. The condom, although sold for the prevention of disease and teenagers, is a great way to store water. You can get over a quart of water into the average condom before you compromise its integrity. That makes it, with **extremely** careful handling, a dandy canteen. Get an unlubricated, rough duty model. For any of you with objections to using such an implement, consider the balloons that are sold specifically for making water balloons as an alternative. They are harder to find and don't usually hold as much, but they also save you a potentially embarrassing shopping trip. Whatever you get, trade them out once a year, as the "rubber" loses strength with age.
19. Paracord – This is another of those dandy reusable items that comes to us courtesy of Uncle Sam. Also known as 550 cord, this is the stuff that is used for parachute shroud lines. It's light enough to carry, strong, and can be used over and over for lashing stuff together. I keep mine in a little coil that hangs from the lanyard hole of my knife. It also secures my knife to the pouch, so I stand little or no chance of losing it.

20. Split Shot – These are tiny lead weights that make fishhooks sink. I've never used them in a survival situation, as I have minimal access to fishable water here in Tucson, but a tiny fishing kit makes so much sense that I carry the fixings nevertheless. Besides, who said I was going to get lost where I wanted to! In almost every temperate climate, you will want a fishing kit.
21. Fishhooks – For a fishing kit you need fishhooks, right? Two small hooks with their attached leaders go in. Now don't go thinking that I'm crazy here, but I've caught a lot more ground squirrels with fishhooks than I've ever caught fish. As a matter of fact, a good little fishhook, a dab of peanut butter, and some patience is the best recipe I know for stew. I'll describe how and where you stow them in the next section.
22. 100' of 10# fishing line – The line that completes this kit goes in too.
23. 5' of Duct Tape – You didn't think I'd leave out the duct tape, did you? I will leave out the impassioned talk about the many uses of duct tape, however. The way that you use it in this kit is to wrap the outside of the kit so that the duct tape secures the tongue of the kit to the pouch. Velcro may be the 8th Wonder Of The World, but it's not foolproof. (It's also all right to put little things you couldn't find room for between the wraps of the duct tape. I've got two big safety pins tucked in that way.) You'll want to use some high quality duct tape for this use, as it's going to get a bit beaten up. The G.I. green 90 mile an hour tape is the "school solution" but really high-grade duct tape is also available from HAZMAT supply houses in a variety of other colors. I like black or dark green because they make my kit less noticeable. (By the way, the best use I've found yet for my duct tape in the field is to make a canteen cover for my condom filled with water.)
24. Pen – The barrel of a small ballpoint pen will fit down in the little pen pouch with your firestarter rod. The stuff in your wallet or small pieces of duct tape can be used as the paper you'll need to write notes to potential rescuers.
25. Compass – The function of the survival kit is to give you options other than sitting and waiting. The compass gives you the ability to find your way out from and back to your base (preferred), or to attempt to walk to either civilization or more resources without getting even more lost. I keep a tiny, liquid filled compass in the handle of my knife. Good tiny compasses are very hard to find, so keep your eye out for key chain and lanyard compasses that are tiny enough to be carried yet good enough quality to trust with your life. Suunto and Brunton both make good ones.

Now, how in the heck do you fit all of this stuff into a single pouch? The short answer is that it ain't easy. Stick with me though, and I'll walk you through it compartment by compartment.

As I said earlier the Rigger's pouch is basically a squarish Cordura nylon pouch that is available at surplus and police stores and comes with a Velcro flap and loop that attaches it to a belt. There are two sleeves, one on each side, that are sized for a pen and a Mini MagLight in the 2 AA battery size. I've already told you how to modify a MagLight to hold your medications, needles, and tinder (and maybe a compass), so just shove the little devil into the sleeve and we're started already.

Remember what I said about creative visualization? That whistle is not only a

whistle; it's a fishing kit holder. Here's how to rig the whole mess. Take the hooks and insert them point first into the air space of your whistle. Wrap the leader around the whistle barrel and secure it all with a wrap of plain old Scotch tape. Then wrap the 100' of fishing line around the barrel also. Drop the split shot into the air chamber to block the air chamber. Then wrap the whole mess with one wrap of duct tape. Your whistle just became a fishing kit holder

Into the pen sleeve goes your magnesium firestarter rod and the ballpoint pen barrel. I got an extra 50' of dental floss down into the tip of the pen sleeve once, but that was just showing off.

The first compartment in the main pouch group is all the way towards the back where the folks who use this normally shove a pair of EMT scissors. I put my signal mirror, the Microlight and my knife here.

There is another compartment available just forward of this one in which I stick a credit card and a phone card with around $10 on it. If you operate close to the border make sure you get one that works in Mexico as well as *Los Estados Unidos*. In one side of the main compartment I make a sandwich of my diamond hone, butane lighter, and whistle. My emergency blanket takes up the rest of the space. You will have to do some serious folding to get it in. There is just enough room to push the Cyalume stick in also.

In my kit, and only because I have a hollow handle knife, I put the compass, condoms, and butterfly bandage in the knife hilt. If your knife does not have a hollow handle, you can put this stuff between the wraps of the exterior duct tape with the exception of the little compass, which will go into your medicine container.

If your knife has a lanyard hole, run the 5' of paracord through it and make a nice coil knot to secure the lanyard. If your knife does not have a lanyard hole, consider either drilling one or getting one drilled for you. Losing your knife is not a good start to a survival scenario.

Now you've got a nice little survival kit that you can combine with everything else on your body to keep you out of trouble. What I mean by everything else on your body is just that, the stuff you have that is not part of a survival kit and can be used to keep you alive. There are few of us that go out without the one essential of daily existence, the cell phone, for example. This little goodie, which wasn't a gleam in whoever invented its eye when Nick and I put this kit together, can seriously save your butt. If you don't have one, get one you Luddite!

Another great source of gear is your wallet. All those business cards, dollar bills, and other stuff make dandy dry fire starters. Like I said, think out of the box. Hopefully, you also make a practice of wearing a hat and carrying a bandanna.

There you go. I hope you'll agree that this is a lot of stuff for a small package.

Unfortunately, without practice and the engagement of your "brain housing group" that's all that it is. The bottom line is that you will have to be sufficiently familiar with the uses of this equipment to use it to survive. So play with this gear for a while before you pack it away. Zap some friends with the mirror. Get tight with the blanket. Try to make a field expedient fishing rod and actually catch a fish

(or a squirrel) with it. Remember, the nice folks in the military devote serious training time and money to survival schools. If it were as easy as handing out a kit, no one would ever get lost.
Good luck!

THE TRIP TICKET

One of the best ways to get yourself found is to let someone know you're lost. A simple, low-tech device called a trip ticket will be an invaluable aid for anyone who may be looking for you. It can be left with someone you trust, referred to in a phone message to a trusted friend and left on your kitchen table, or dropped off at a ranger station. Even if it is just left on the dashboard of your car or truck at the trailhead where you go hiking, it will greatly improve your chances of getting found by letting SAR personnel know details about your itinerary and gear. It is truly the one thing you should never leave home without doing. The trip ticket breaks down into four discrete sections that tell rescuers who you are, what you want to do, what you are wearing, and what you've got with you. Each member of a hiking party should fill out a separate trip ticket. There's just too much information to try to cram it into one form.

Let's look at a sample trip ticket, first broken down with commentary about what each section does, and then in a format that you can have reproduced for your use:

DATE & TIME_____

(This would be the date and time you actually intend to start hiking. If you are filling this out ahead of time to leave with someone else, be as precise as you can be.)

NAME_____

(This is pretty obvious, but you should use the name that'll get you found and allow rescuers to access information about you. If you go by a nickname, put it down too.)

NUMBER IN PARTY_____

AGE_____

HEIGHT_____

WEIGHT_____

SEX_____

RACE_____

PHYSICAL CONDITION_____

_____

(This is where, in addition to letting folks know what kind of shape you're in, you tell them if you have any preexisting medical conditions, like heart trouble or diabetes.)

AMOUNT OF WILDERNESS EXPERIENCE _____

(Be honest, please. Your assessment here will give rescuers an idea of just how excited they need to be to get you found. If this is your first hike alone, they'll mobilize a significant amount of limited and expensive resources to go and get you right away, whereas if you're a twenty year veteran of the Mountain Rescue Association or a Green Beret, they may give you a while to work your way out of the woods by yourself. You are trying to paint an accurate picture here.)

VEHICLE TYPE_____

MODEL_____

COLOR_____

(Let's face it; most of us drive to where we start hiking. Identifying your car in a lot at a trailhead gives rescuers a big boost toward getting you found. If you're walking, snowmobiling, using a mountain bike, etc., either leave this section blank or adapt it to

your circumstances.
START_____
(Where you started or plan to start hiking. If this is a map coordinate, give it. Other good entries include street addresses, trailheads, etc.)
DESTINATION_____
(This is where you plan to complete your journey. Again, be as accurate as you can.)
ROUTE_____
(IF you know how you're going to get from your Start to your Finish Point, put it in here. Good entries include trail names {Ventana Canyon Trail}, route descriptions {"From end of Alvernon up Finger Ridge Trail to peak of Mt. Kimball, then along Front Range Trail to a point north of Pontatoc Ridge, then bushwhacking to Pontatoc Ridge Trail, then down Pontatoc Ridge Trial and back to end of Alvernon."} or simply ideas of how you're going to go {"Up the draw between the two mountains to the north, and walk east until I hit Why, Arizona."}. The more detailed you are, the better chance that someone will be able to find you. **CRITICAL NOTE: ONCE YOU PUT A ROUTE ON A TRIP TICKET, YOU ARE COMMITTING YOURSELF TO GO BY THAT ROUTE. DO NOT VOLUNTARILY CHANGE THE ROUTE YOU PUT ON A TRIP TICKET.** If you do, would be rescuers may go where you said you would go, instead of where you actually went. This will load the dice against your being found. If you're not sure of the route you're going to take, how far you are going, or where you are when you started, put that on the trip ticket. Your life may depend on how well or badly you enter this information. The best route entry I have ever seen on a trip ticket is the sentence, "How the hell do I know, I'm lost!" Coupled with a start position {his broken car} and a destination {Oracle, Arizona}, we were able to guess out the victim's route and get to him in a very short time.)
CONTACT PERSON_____
PHONE_____
(If there is someone you know who would be able to help rescuers by giving them detailed information about you, your plans, or your experience in the field, let them know here. The more complete a picture rescuers can draw about you, the better equipped they are to search for you.)
ESTIMATED TIME OF JOURNEY _____
(How long do YOU think it's going to take you to get from your start to your destination? You don't have to be right, but your best guess tells rescuers a lot about whether you've bitten off more than you can chew.)

Now we're done with the hiking bit. It's time for you to tell rescuers what they need to know about your clothing. In this section you first check the box to indicate that you have the item listed, and then give a brief description that focuses on things that would help people who are looking for you.

CLOTHING:
HAT _____
SHIRT _____
TROUSERS _____
BOOTS _____
(Note: On boots or shoes always give the brand, make, & size if you can. If there is a

particular tread pattern, that's really useful too, but don't go to great lengths here. {"Vibram" is fine.}

If you print your trip ticket on letter size paper, an easy way to give rescuers your tread print and size is just to place the ticket face down on a flat surface (a rug is ideal) and stamp on it with your boot. Usually enough impression will be left to provide rescuers with a really good idea of what you're wearing. If not, you can use a sheet of aluminum foil and get a really good imprint.

OUTERWEAR _____

(If you are wearing or carrying a jacket, parka, rain suit, coveralls, etc. with you, put it down here.)

Now we are getting into the section I call "GEAR". This section provides invaluable clues as to how well prepared you are for what you intend to do. This, in turn, tells rescuers whether they should immediately launch an all out effort involving helicopters, and the total resources of their organization, send a couple of guys up a trail to check on you, or just give you a few more hours to work your way out.

BACKPACK _____

(Type, size and color)

WATER _____

(How much do you have with you? For the purposes of the trip ticket, soda, Gatorade, sports drinks, all count as water. BEER DOES NOT!

FOOD _____

AREA MAP _____

(This means a map of the area where you intend to be traveling, not a state road map.)

COMPASS _____

GLOBAL POSITIONING SYSTEM _____

CELL PHONE OR RADIO _____

(If you've got one of these, please don't just check the box, put down the number or frequency too. If you're going to leave it off most of the time to conserve your batteries, also put the times that it will be on and that you will be monitoring it.)

MATCHES OR LIGHTER _____

DATE & TIME		**CLOTHING:**	
NAME		HAT	
AGE		SHIRT	
WEIGHT		TROUSERS	
SEX		BOOTS	
RACE		OUTERWEAR	
PHYSICAL CONDITION		**EQUIPMENT:**	
WILDERNESS EXPERIENCE		BACKPACK	
VEHICLE TYPE		AMOUNT WATER CARRIED	
MODEL		AREA MAP	
COLOR		COMPASS &/OR GPS	
LICENCE # & STATE		CELL PHONE (NUMBER)	
START OF HIKE		RADIO (FREQUENCY)	
DESTINATION		MATCHES OR LIGHTER	
ROUTE		1ST AID KIT	
CONTACT PERSON		EST. TIME OF TRIP	
CONTACT PHONE #		START TIME	
OTHER INFO.			

SAMPLE TRIP TICKET

SECOND STAGE SURVIVAL EQUIPMENT II

THE $15 SURVIVAL KIT (OR THE STUFF IN MY CAR)

(THIS IS THE STUFF I SUGGEST TO THE GENERAL, NON-RESCUE, PUBLIC)

The problem with "survival kits" is that they are either too generic to be really useful, too expensive to be practicable, or too heavy to be includable. Survival kits that attempt to do all things usually do nothing very well. This is because survival kits are best employed when they are aimed at survival within a particular range of climates and terrains and may not work well, or at all, when removed from those conditions for which they have been designed.

There is also a tendency to "muscle" a problem with technology. But by including a bunch of highly technical stuff, the likelihood that the gear can be used without training, or afford it lessens.

So what's a lad to do? I suggest that a simple, practicable survival kit can be constructed for use within a single habitat range, in our case, the Arizona Sonora Desert. This kit will draw heavily on the use of stuff that costs very little cash (approximately $15), and will be vehicle and man portable. It will require little training to use, as most of the equipment will be intuitive or already familiar to the user. Best of all, most of the stuff is free.

What's in it?

1. A light colored long sleeve shirt – free (Use this to cover your body and avoid sunburn. While you're at it, you'll slow the rate at which you lose water and provide some clothing for the cool of the night.)
2. Light colored long trousers – free (Use this to cover your body and avoid sunburn. While you're at it, you'll slow the rate at which you lose water and provide some clothing for the cool of the night.)
3. Five 3-liter soft drink bottles filled with water – free (Hey, you drink it! Lexan soft drink bottles are the cheapest, most durable canteen around, and will take a lot of abuse before they rupture. Clean them very well before you use them for long-term water storage.)
4. A good glass signal mirror - $10.00 (If there is a single better signaling device for desert terrain, I don't know what it is.)
5. 50' of dental floss - $1.00 (Cordage, general lashing, and dental care.
6. 1 BIC lighter - $1.00 (Fire starting.)
7. A bandanna handkerchief – free (You lose water and get sunburned on your face too. The more you cover, the more comfortable you are. Not a bad dust filter either.)
8. 3 large lawn and leaf bags - $.50 (The world's cheapest shelter.)
9. 10' of duct tape wound around a pencil – free (Stuff rips, duct tape fixes stuff.)
10. $1.00 in quarters - $1.00 (Nothing sucks worse than hitting a pay phone with no change. A cheap phone card can go in here, too.)
11. 50' of paracord - $0.50 (Way better tie-em-ups than the dental floss.)
12. A cheap, wide brimmed hat - $2.50 (See my earlier diatribe on hat use in deserts)
13. A whistle - $1.00 (Yelling uses lots of energy and water, a whistle makes way more noise for way less resources.)

14. One trip ticket – free (Just in case you decide to leave your car and walk out. Fill out the Trip Ticket, and duct tape it to your windshield on the inside with the printed side showing through the glass. Give the folks searching for you a little help.)
15. 10' of aluminum foil or a survival blanket - $.25 to $6.00 (Signaling, shelter, a pot to boil water, this is another of those many uses type pieces of gear. Some day I dream of putting on a show called aluminum foil origami.)
16. A stout pair of shoes and a pair of good socks – Free (This is for those of you who do not wear hiking boots 24/7. It may be stylish to show up in your alligator cowboy boots or Manolos, but you really don't want to get stranded in them. Take a pair of old jogging shoes, stuff a pair of old but not completely shot socks in them, and pack them in with the rest of the stuff. If you do wear hiking boots 24/7, ignore this suggestion.)
17. A box to put it all in – free (an old backpack works well, too.)

The idea here is to gather the stuff you need for your survival in one place, say the trunk of your car, load it up and forget about it until you need it. (You folks in S.A.R.A. already have this idea down in the form of your personal rescue packs, which you store in your car any time you are going out of the range of sidewalks and Starbucks, right? What, you don't? START!) Once assembled, you will only have to visit this kit often enough to keep the water from going all green on you. (If you add a bit of household bleach to each bottle, this will be about once a year.) The duct tape, trash bags, and lighter should be replaced every five years (yearly if they're stored in sunlight). Other than that, it's a forgettable piece of insurance for one person.

It also goes without saying that one of these should be loaded into every vehicle you own, as otherwise you run the risk of having left your survival equipment in your "other suit". And, equally obviously, you can make substitutions for some of this stuff without hurting the utility of the kit, say dropping the stuff in a backpack instead of a box, or substituting a five gallon jerry can of water for the soft drink bottles, but the central idea remains the same. With this kit, one person can last for about seventy-two hours under extreme desert conditions, signal for help, and remain more or less unscathed by the whole affair. Not a bad deal.

WAIT! I hear you wail. There's no food in there. That's right, it won't kill you to go hungry for 72 hours. But if you absolutely have to have your chow, consider adding five or six METRx food bars to the kit. Each one has a whole bunch of calories, and they taste like someone already ate them, so you won't raid the goodie locker one night at the drive in. Personally, I'd rather starve.

GLOSSARY

Apex = existing at the top of a food chain. For example, the Golden Eagle is the apex avian predator in tundra biomes where it occurs.
Arroyo = a watercourse cut by water through soft soils or rocks. Arroyos often have soft sides that are susceptible to cave ins.
Bajada = an alluvial fan descending from a mountain drainage.
Barranca = a steep rocky watercourse, usually formed between two parallel formations of rock
Chicken head = a protuberance of rock that stands out like a bollard from the side of a rock formation. Chicken heads are formed when selective weathering removes soft rock from the base of a rock protuberance, leaving the harder rock to stand out from the general surface.
Chubasco = Short violent storm formations that occur in Horse Latitude deserts when weather systems are pushed over barrier mountains and deposit rain in the deserts behind the mountains. Chubascos in the Arizona Sonora Desert are pushed from the Northwest by tropical storms in the Pacific.
Dao = Literally, Chinese for Way. Dao is a word used to describe a system or philosophy, as in Dao Tse Ching, which translates to Way of Ching (Confucius).
Ephemeral = Containing water for only part of the year.
Flake = A slab of rock that is partially separated from the main body of the rock formation
HAZMAT = an abbreviation for HAZardous MATerials.
Jacale = A brush shelter formed by entwining branches to form a framework and then mounding or fastening brush to the outside.
Krumholtz = a band of heavily weathered vegetation, usually coniferous, that exists at the margins of tundra. Krumholtz is formed when conifers growing at the edge of tundra are subjected to fierce wind conditions that inhibit their normal growth. Krumholtz bands are very difficult to traverse, being made up of small trees that are tightly woven together.
Los Estados Unidos = The United States of America in Spanish
Primo = rock climbers' term for virgin or untouched rock, literally first class in Italian
Manolos = High dollar, high heeled ladies footwear
Tanto = a short knife with a chisel tip.
Tuff = a soft volcanic rock

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