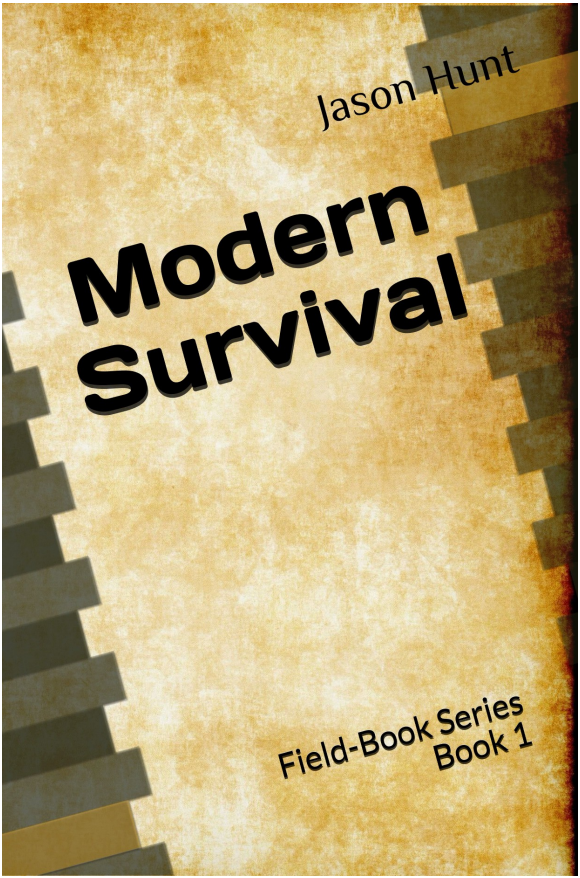

Jason Hunt
Modern Survival
Field-Book Series
Book 1

MODERN SURVIVAL
Field-book Series

Book 2
Fire Starting Essentials

About this booklet

The Modern Survival field-book series has been designed to accompany the on-site course available through the Campcraft Outdoors Field School (campcraftoutdoors.com) and the online Modern Survival course through the Old World Alliance (oldworldalliance.com).

Alone, we believe this booklet series will transmit a great deal of insight regarding modern survival skills and how they will make your outdoor adventures safer, more meaningful and instill and greater confidence in your ability to endure when the worst conditions are against you.

Fire Science 101

1 Cor. 3:13 *...It will be revealed with fire, and the fire will test the quality of each person's work.*

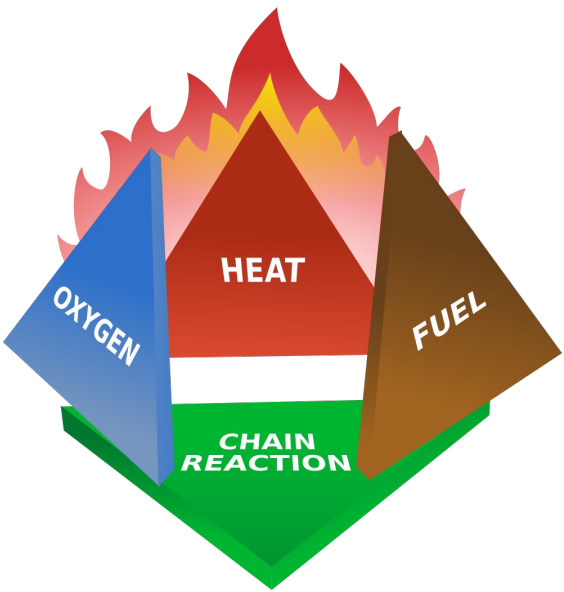
With fire skills reigning as one of the most important survival skills to know and certainly one of the most popular to practice, it makes sense to invest time in learning to understand what exactly this elusive element is- what it's really made of- before delving into ways to wield and manipulate it.

So, what is fire?
Fire, simply put, is a chemical process of combustion involving the oxidation of a fuel source at a high temperature. It releases energy and produces heat and light.

Flames are produced following the chemical reaction between oxygen and another gas and are intensified by increasing the rate of combustion. Four elements, also known as the fire tetrahedron, must be present in order for a fire to exist. These fire tetrahedron elements include:

- Oxygen
- Heat
- Fuel
- Chemical reaction

When you remove any one of the four elements, a fire can then be extinguished.



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The 5 Stages of Fire

There are five stages of fire, including:

Ignition: At this stage, a fire extinguisher can control the fire such as wind, rain, or snow.

Growth: Additional fuel ignites, causing the size of the fire to increase. At this stage the kindling on the fire begins to burn fuel sized sticks of at least thumb thickness.

Fully developed: This is when temperatures reach their peak, and the fire is sustainable and potentially self feeding. Full size logs are now burning and there is a well established coal bed.

Burnout: The fire gets less intense.

Extinguished: The fire is out with no hot spots.

The 5 Fire Definitions

In the Modern Survival course, we have some specific fire related words or phrases that require definition as people use different terms depending on their location or training. For the sake of getting everyone on the same page:

Venturi Effect: This is a jet effect that occurs when a fire lay is properly constructed. The center of the fire sucks air in from the bottom and projects the heat and flame up. This is especially important when boiling water and when creating emergency fires and signals.

- *The Venturi effect is named after Giovanni Battista Venturi (1746–1822), an Italian physicist.*

***Sustainable Fire*:** A fire that is burning fuel at least the thickness of your thumb or one inch in diameter. Once a fire is burning fuel of this size, it is sustainable enough to walk away from to collect more fuel for the fire.

Quick Fire: A fire starter such as a cotton pad soaked in lamp oil, wrung out, then dipped in wax or a commercially made fire starter designed to work in poor weather conditions.

Fatwood: Also known as "*fat lighter*", *"lighter wood", "rich lighter", "pine knot", "lighter knot", or "heart pine"* is derived from the heartwood of pine trees. The resin acts as an accelerant even in wet conditions.

Scavenger Mentality: When scavengers see an opportunity to get something, they take it. We must practice scavenger mentality when it comes to fire building resources. We must think of the current fire and the next fire we have to make, so we should always be collecting resources materials because WE NEVER KNOW WHEN WE WILL NEED THEM. So, when you see a good fire resources, grab it!

Tinder, Kindling and Fuel

Tinder is the hair like, fine fibers that provide a large overall surface area to take a spark. Finely processed inner and outer barks, grasses and fibrous plant materials work well as natural tinder sources.

Kindling is small diameter wood pieces ranging in size from the sharp end of a pencil to the size of your fingers, but not your thumb. Kindling is what enables a fire to become hot, fast. Feeding continually during the growth stage with kindling will establish a coal bed faster for later cooking.

Fuel is anything the diameter of your thumb or larger. Fuel sized sticks will not only enable you to reach fire stability, but permit you to fully develop the fire for cooking, heating shelters and other survival related projects.

The 5 Natural Tinder Sources

Mnemonic Device: “As big as your head or your Fire is dead” Students will typically choose smaller amounts of tinder to make nests the size of song birds. We want an Eagles nest when it comes to making a fire for survival, this is do or die!

Inner Bark

The dry inner bark from dead trees and plants can be stripped and processed into excellent tinder material. Look for the dead inner bark from trunks and branches of tulip poplar, cedar, black locust, ash, basswood, and cotton wood to name some of the more common to the Eastern

Woodlands. Plants that are used for cordage material, such as milkweed, dogbane, and stinging nettle can also provide inner bark tinder.

Inner barks are processed by pounding, tearing, twisting, scraping, or buffing. Pounding is usually the best way to fluff up barks. When processing in any of the ways listed above, catch the fine fibers in some container and use them as the core of the finished bundle. These fine fibers have a large surface area and will ignite more readily.

Outer Bark

The outer barks of trees such as birch, cedar and

juniper can all be processed much like an inner bark. Cedar and juniper smolder more than anything but they hold heat well and aid in increasing the internal temperatures of a tinder bundle to achieve ignition. Birch barks are the preferred by many as they will ignite readily from an open flame and with some processing they can accept spark ignitions from ferro rods.

The finer the bark is processed, the more readily it will ignite due to the decrease in overall surface to be burned, so tearing into thin strips or roughing the surface goes a long way in achieving a fast ignition.

Fibrous Plant Material

The dead tops from many plants can be used as tinder source. Some tops, such as goldenrod, have several grades of tinder in their top. Goldenrod has a fine down that is surrounded by a papery chaff, which is on slender twigs. These mixed grades of tinder can burn furiously and serve as an example of how different grades of tinder burn well when mixed together. Seed down from cattail, thistle, or milkweed pods can also be used as flash tinder. These almost explosive materials combust quickly but do not burn but for a moment.

Weed tops and grasses usually do not require processing. Some weeds have a white, Styrofoam like core called a medulla, commonly called a pith. Plants with a pith such as teasel, thistle, milkweed, and dogbane make excellent resources for charred material. By charring the pith you create another fire making resources than will accept a spark readily to become an ember which can be nursed to ignite a fire.

Fungus

The fire making properties of various types of fungi has been known for thousands of years. Ötzi the Iceman had pieces of fungus (fomes fomentaris) among his belongings and likely used it for his fire making and medicinal properties. There are several types of fungi that will carry a viable ember the most common of which in North America are:

Cracked Cap Polypore (Phellinus robiniae)
Horse's Hoof Fungus (Fomes fomentarius)
Chaga (Inonotus obliquus)

Each are used in a similar fashion so far as fire making is concerned. You saw into or crush the woody fungi to increase it's surface area to

accept a spark which will grow into an ember. This ember is then transferred into a bird's nest tinder bundle to be blown into a flame.

Tree Accelerants

Tree accelerants such as Pine resin, which is infused in fatwood, are wonderful resources for fire kits and permit survivalists means of extending the life of their resources by creating new ones. By cutting slivers of wood and covering one end in pine resin, a type of match can be made than will accept an open flame.

This same resin can be smeared into flash

tinders such as cattail thereby extending their burn time and volatility, and added to any number of natural materials to create fire starters. Whenever you see pine sap globules hanging from a tree, take them and store for later use.

The 5 Ignition Methods

Bic Lighter

We recommend the Bic brand lighter because they are guaranteed from the factory to ignite 3000 times per lighter and because the plastic body, when scraped into shavings, makes a viable option as a tinder source.

The lighter should always be your first go-to item when making a fire in an emergency. Users should have an understanding of how to rescue them once being submerged, how to rewarm them when cold and how to make use of them when damaged or even broken.

Ferrocerium Rod

The ferro rod is an excellent emergency fire starting device. It's been proven for decades by the military and now that survival and bushcraft skills are more main stream, the improvements in available models are nothing short of

staggering. For general kit use we recommend a 1/2” diameter x 5”-6” long rod. This will permit the user to have a many years of fire making ahead of them whilst maximizing the effectiveness of their ability to ignite marginal fire materials.

Solar Magnification

Solar magnification is the most economical method of making a fire because the sun is free and renewable. A magnification lens or card (Fresnel Lens) that is at least 5 power provides plenty of strength to capture the rays of the sun and turn them into a mini laser beam. Sandwich bags filled with water, water bottles (glass or plastic), steel spoons and even condoms can also be used as a means of achieving enough magnification to elicit a solar ember ignition.

Flint & Steel

Flint is not one specific type of rock, but a collection of rocks that are above a 7.5-8 on the Mohs scale of hardness. Cherts, Quartz and Obsidian are all types of flints. For the flint to be useful it must first be *dressed*, which means to have an edge put on it by breaking away some of the stone to create a sharpened edge. This sharpened edge is then struck against a high carbon steel striker or piece of metal.

Upon striking the surface of the metal, the flint cuts off particles of the steel and upon contact with oxygen in the air, the surfaces of the particles spontaneously ignite and give off heat as they oxidize (rust). Because the surface area

of the metal particles is so large compared to their volume, the particles quickly heat up and glow red hot. They become sparks.

These sparks must be collected into a material that will accept a spark of relatively low temperatures, yet will still ignite at said lower temperatures. Previously burned materials, known as charred materials are capable of receiving such a spark. Charred cotton cloth, plant pith, fungus and even wood can be easily ignited with the sparks of flint and steel.

Friction

Friction fire is a skill you most certainly do not want to rely upon in a true survival situation. Not because it's inconsistent to do, but because it requires a more advanced skill set due to its multiple moving parts and technical issues that require constant trouble shooting on the fly. Should you be injured, disoriented, dehydrated, hungry, or be suffering from a core temperature control (CTC) issue, performing this skill becomes exponentially more difficult.

The Bow Drill technique is the most common friction fire skill used in the Eastern Woodlands used primarily by the Algonquin but it actually dates back to at least 8000BC according to an extensive archaeological study by the Institute of Archaeology of The Hebrew University of Jerusalem and the University of Florence in Italy. In this 2012 study which was again updated in 2017, the earliest known bow drills parts were created from fire hardened clay. It's a very common tool throughout Europe and into Asia.

Other friction fire techniques include the pump drill used among Aboriginal cultures from the Inuit to the Iroquois which carried over from

primarily Asian influences; the hand drill primarily found among the Mexican tribes of the West/ Southwest and the fire plough/plow which oddly enough, no one agrees upon from whence it came and is therefore one of the oldest of the friction fire techniques. It's commonly used among island nations and in low humidity regions.

The 5 Fire Lays

The way we lay down sticks to make a fire is an important part of the fire starting process. If we lay all our sticks in one direction packing them too tightly together or conversely, too far apart, we would have too much or too little air and contact between burning surfaces which will not only prevent the fire from heating up properly, but will starve it of fuel, thereby stunting it's ability to sustain itself.

Emergency Fire (Chaotic Tipi)
The simplicity of the Tipi is hard to beat. Take a handful of sticks in each hand and place one over top the other to create an inverted V shape. In the center of the V, place your tinder bundle. Ignite the tinder, then, grasp the top of the V and stand it up over your fire. This cone of sticks has

a great fuel-to-air ratio, which equals a great burning fire lay that is quick lighting and dependable, even with damp materials.

Long Fire (Winter Warming)
This fire will provide a wider swath of radiant heat which will last you through the cold winter nights. The idea is that you make the length of the logs as long as your body or at least the length of the opening of the shelter you're using. This fire is commonly used with super shelter systems and does a wonderful job of maintaining heat within a half-faced or lean-to style shelter.

Water Boil Fire Lay

While you can of course boil water in any fire lay, this specific one is designed to do it as quickly as possible. We begin by placing out steel bottle on the ground then surrounding it with our tinder material. We then place kindling around the bottle in a log cabin style fashion, then tipi an armload of sticks over top the whole thing before we attempt ignition. Once ignited, we ensure that the fire is surrounding the bottle and burning well, then we add an additional arm load of kindling to the top. Water will boil this was often in under three-minutes time, but most certainly in less than ten so long as there isn't a downpour of rain.

Cooking Fire (Hunters/Trappers Fire)
The Hunter's Fire Lay, also called the trappers fire is a technique made popular during the age of the mountain men and fur trappers. It's essentially a long fire used for cooking. Align two 6” diameter logs, one on each side of your coal bed, from the previous nights long fire spaced apart as wide as your skillet or flat bottomed cook pot. Ideally, the prevailing winds will travel into the fire between the logs, thereby keeping it nice and hot for cooking.

You set your skillet or cook pot on top of the logs. You can cook several dishes this way at

one time and also have space to manage or feed the fire as necessary.

Siberian Fire Lay

The Siberian fire is one specifically suited to protect your fire from rain or snow. The roof provided over top your main fire shields it from the elements while still permitting the roof logs to burn overnight. It provides suitable warmth and leaves a fairly small footprint when compared to the long fire.

The great thing about this fire lay is that it's meant to be scaled up. It's called Siberian for a reason! Harsh winters and extreme cold temperatures are endured by the Evenk people of Siberia annually and this fire lay helps them trap

and camp all winter long. Scale this up to 4”, 6” or 8” logs to increase all the heat, burn time and sleep time you can get while afield.

Fire Skills

The following fire skills are listed in order of their progression within the Modern Survival course. A brief explanation of the technique and testing elements are also included so you can get the most from your own training and be better prepared to complete the Modern Survival course should you decide to complete the on-site class.

1) Rescue a Wet Lighter

Once a lighter has been submerged in water remove excess water with a few flicks of the wrist. Then, remove the child safety covering from the flint wheel, make sure you bend the barbs that hold it in place back down on the shroud. Now, dry the flint wheel by either wiping it off as you rotate it or by running it back and forth over your pants across your thigh briskly. Once you see sparks and a hint of flames it's ready to light.

Perform this rescue on 5 different lighters, time yourself each time to see if you improve.

1: _____

2: _____

3: _____

4. _____

5. _____

2) Lighter Tinder Fire

Using the spine of your knife, scrape off the body of your lighter to create a pile of shavings roughly the size of a quarter (25 cents). Ignite the pile using your ferro rod, then ignite a tinder bundle with it as a way to prove viability. Make sure to scrape from all sides of the lighter and not just one side which may inadvertently cause a leak or explosion of lighter fuel.

Practice this technique on two different lighter brands and note any differences you discover.

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3) Create Char Cloth & Material

Place 100% cotton or plant pith material inside a metal tin. If the tin is tight and without hinges, poke a small hole in the top or edge of the rim (through the top and bottom pieces) and cook it on the fire for at least 7 minutes (you can't overcook it). You'll see a small gas exhaust jet often ignite from the hole. This is normal. Once the flame goes out from the exhaust jet, it's typically completed charring.

You may now remove the tin from the fire, but do not open it until it's completely cooled as the reintroduction of air will cause the material inside to combust. Once cooled to the touch, open the tin and examine your char material. It should be completely black, if not, just cook some more.

Try making some charred material from cloth and plants. Note the items you used to make char.

NOTES: _____

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4) Fire with Flint & Steel

Now use your charred material with your flint & steel set to create a fire. You may rain sparks down into your char tin or elect to place the charred material on the flint, then strike that way. Whatever your chosen technique, make a note on which way you favor and which charred materials you found worked best for you.

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5)Fungus Fire with Mag Lens

Locate a piece of fungus from a local tree if at all possible. Process the material using your saw and ignite it with your ferro rod. Transfer that ember into a bird's nest once it reaches about the size of a dime. Then blow it into a flame. Once you have successfully used your ferro rod, try using your magnifying lens to do the same thing. Finally, try charring the fungus and using flint and steel. Note your findings- Did one method prove more consistent? Did you prefer one method over another? What types of fungus did you use?

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6) Carry fire across distance

This is a skill that will enable you to take your fires with you should you decide to move camp. There are three methods to try for this skill, one is to ignite an ember into a piece of fungus, two is to ignite an ember into a piece of charcoal, and the third is to braid some natural cordage and get an ember glowing on one end of it. Try all three techniques and cover some ground with each one, try to walk at least a mile.

Note about how long each piece lasted you and how far you were able to travel. This information will give you a better idea of how large or small the material should be based on the distance traveled.

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7) Duct Tape Tinder Fire with Ferro-rod
Duct tape, Gorilla brand specifically, works well as a tinder resources even in the rain. Process a tinder bundle from tape and ignite it using the pump technique with your ferro rod. Note how long it took you to ignite it the first time, then perform the technique a few more times to become more proficient.

Not all duct tapes are created equal, so if you use other brands joy down the ones that worked the best for you.

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8) Fire with Ferro-rod and Natural Material
Create a tinder bundle the size of your head from material off the surrounding landscape. Your objective is to ignite the material using only your ferro rod to create a sustainable fire in less than 5 minutes.

Perform this skill at least three times and note your times at reaching sustainability.

NOTES:

ATTEMPT 1: _____

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ATTEMPT 2:_____

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ATTEMPT 3: _____

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9) Fatwood Fire with Ferro-rod

Go afield and locate some pine trees and try to harvest your own fatwood. If that is out of the question, then use store bought fatwood. Process some down to create a pile of tinder and then split or feather the remaining pieces into your tipi fire lay. Ignite using your ferro rod to create another sustainable fire in 5 minutes of less.

Perform this skill at least three times and note your times at reaching sustainability.

NOTES:

ATTEMPT 1: _____

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ATTEMPT 2:_____

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ATTEMPT 3: _____

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10) 3 Minute Fire with Quick Fire

Use a pre-made fire starter for this sustainable fire effort. This can be a store bought item or one you have made yourself. The tipi fire lay will again be used, but only give yourself 3 minutes to achieve sustainability!

This will test your ability to select the best of dry materials and your fire lay skills. Perform this skill at least 3 times using different types of fire starters and note your preferred brand or style.

NOTES:

ATTEMPT 1: _____

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ATTEMPT 2:_____

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ATTEMPT 3: _____

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11) 10 minute Water Boil Fire

The ability to boil water quickly will enable you to stave off hypothermia by creating a fire and getting warm liquids in your body. This is also a useful skill when you have to treat a patient while afield or if you're on the move and have little time to waste.

Make sure to get a good tinder bundle surrounding your bottle and choose good kindling too. Log cabin stack it around three sides of the bottle leaving room to start the fire in the front. Pile on kindling to about knee high, then let the fire do it's job. Perform this 3 times and note how long it takes you to reach a rolling boil with each attempt.

ATTEMPT 1: _____

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ATTEMPT 2:_____

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ATTEMPT 3: _____

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