How To Trick Thermal Imaging

2018-01-29 08:00:48 By Cache Valley Prepper

BLUF (Bottom Line Up Front):

- There is little sense fooling with space blankets or a suit some guy made and tested at home in his yard when real, military multispectral camouflage netting and suits are available on the surplus market.
- Thermal crossover occurs twice a day and is when it is hardest to spot you with thermal imaging.
- Shade prevents thermal loading during daylight hours.
- The average human skin temperature is 91 degrees Fahrenheit, so now you know.

"Any sufficiently advanced technology is indistinguishable from magic." – Arthur C. Clarke

... at least until you understand how it works. If the technology was made by a man, "What one man can do, another man can do." This principle applies to facial recognition, locks, burner phones, privacy-related IT, thermography or any other technology that is troubling to survivalists. One you understand how it works, it's no longer a "black box."

Hollywood exaggerates and embellishes the capability of thermal imaging and other technology. This promotes an exaggerated fear of high tech weapons, which the military and federal government do not discourage and could be seen to exacerbate with selective release of nighttime gun camera and other footage of drones and helicopters engaging personnel and vehicles with heavy weapons while they are silhouetted against the desert floor, which is kind of like trying to hide on the surface of the moon, in the dark.

Principles of Avoiding Detection by Thermal Imaging

Take Advantage of Thermal Crossover

Thermal crossover a natural phenomenon that happens twice a day and is when temperature conditions are such that there is a loss of contrast between the infrared signatures of two or more adjacent objects on the same screen, causing them to become indistinguishable.

Thermal crossover times for different objects can be predicted if you have a thermal imaging camera.

Using thermal imaging cameras and observing yourself in the terrain you are operating in will help you better understand what is harder and easier to see with thermal imaging technology. Thermal crossover can also be used to make multispectral camouflage products seem far more effective than

they really are.

The science-savvy survivalist can also take advantage of thermal crossover with nothing more than a thermometer. Let's say you are operating in the AZ desert during the day and the daytime temperature is in the low 100's Fahrenheit.

At night the temperature starts dropping. Since your skin temperature ranges from the high 80's to high 90's, there will be a point where much of your environment is in the same temperature range as your body. The average human skin temperature is 91 degrees Fahrenheit.

During this time, thermal imaging cameras are at their least effective. This phenomenon will occur again as it warms back up.

Once the sun has been down a while, the temperatures will drop, but large rocks and rock formations retain heat because of their considerable thermal mass, especially dark boulders that absorb a lot of energy from the sun. Curling up next to one of these and 'playing rock' can prevent your detection.

Suspend some veg'd up multispectral netting and hold still to further diminish chances of detection.

Multispectral Camouflage

Saab's Barracuda line of Advanced Camouflage Systems used by the US military includes systems for soldiers, vehicles and force protection. The Mobile Camouflage Systems (MCS) is line for vehicles and features internal heat reduction, visual, near-infrared, thermal infrared and radar camouflage.

The Ultra-Lightweight Camouflage System (ULCANS) is for static positions. The Special Operations Tactical Suit (SOTACS) is for the individual soldier and includes visual, near-infrared and thermal camouflage elements for a variety of terrain types.

The Camosphere is a lightweight system for crew-served weapons that falls away and closes quickly, reminding me of a scaled-up hunting blind for goose hunting. The Polish Berberys-R systems by Miranda are another example of a line of multispectral camouflage.

Military multispectral camouflage has some very important differences from civilian-designed suits. The military suits have much better ventilation, more usable and offer an 80%-90% reduction in thermal signature.

I appreciate what folks are attempting to accomplish, but in this case, military-order spending has funded sound science, resulting in a far superior product. My recommendation is to either buy military multispectral netting on the surplus market or incorporate the same principles and features in your design.

I will touch on some more issues with the civilian offerings I have seen to date under 'sealed suits' under the heading 'Myths & Misrepresentations.'

Changing Temperature

Thermal imaging makes is easy to pick out objects that are a static temperature, but It is more difficult to identify objects from that are changing temperature, especially if the entire object is not changing temperature at the same rate. This can cause parts of the object to fade in and out.

How to Trick Thermal Imaging

Change Your Shape – The human body has easily recognizable features: the human head, human face, 'V's' at armpits and crotch, hands, feet. Balling up or laying down with arms and legs together and tucking your head substantially changes your outline.

Change Your Behavior – Man stands erect, walks on two feet, carries firearms and has a gate that is unmistakable. All these things scream 'human' or 'combatant.' Ball up or stretch out and tuck your head and lay still. If an aircraft fires heavy weapons near you, play dead! Run around and you will attract more fire.

Dig In – If you disappear deep into a spider hole, underpass or culvert, there is nothing more to see and more importantly, there is no target to shoot at. Aircraft often must economize fuel and ordnance, so waiting them out for a few minutes can be an effective strategy.

Mountainous Terrain – It is one thing to spot a patrol or a vehicle in featureless desert and another entirely to spot someone in rocky or mountainous terrain.

Forest – Trees, thick vegetation or dense cacti can make it very difficult to find

Hold Still – Since thermal imaging displays video imaging in real time, movement attracts attention.

Shade – Shade reduces the effect known as solar loading. When equipment sits in the sun, it absorbs energy and heats up. That heat is retained and radiated at night and the contrast in temperature is very visible with thermal imaging. When equipment is shaded under netting during the day, its temperature is closer to surrounding terrain and vegetation which makes it harder to detect.

Let Vehicles & Equipment Cool – As with shade, when you run vehicles, the motor, catalytic converter, brake drums or rotor, exhaust system and other components heat up which makes them stand out on thermal imaging.

A cover as simple as a wool blanket or poncho liner can mask your heat signature for a short period of time if it is stored away from your body and much longer if it is suspended several inches from your body.

Placing vegetation on top of a poncho suspended poncho liner and then lining it with an aluminized combat casualty blanket (like a heavy duty ripstop emergency blanket that has grommets and is olive drab on one side) is a more effective cover.

Just make the edges irregular. If heat leaks along a straight edge, that is a very good indication of a shelter or equipment since naturally-occurring straight lines are few and far between in nature.

Distance – The farther you are from the thermal imager, the harder it is for the imager to detect differences in temperature. Use distance to further degrade contrast. Some systems do not have much magnification. With those that do, as sensors use greater magnification, the field of view becomes narrower.

You may have experienced this using a spotting scope. This can decrease situational awareness or cause the gunner to lose the target if the target or platform moves too suddenly.

Thermal Imaging Myths and Misrepresentations

Sealed Suits – Sealed suits are often demonstrated to “defeat” thermal imaging technology online. Operating in these suits for hours on end typically falls outside the parameters of the experiment. If it didn’t, the suit would soon warm up or cool to close to the operator’s body temperature.

You will notice that military multispectral camouflage does not use sealed suits, quite the opposite. Military camouflage uses different sizes of netting or mesh to leak heat in different shapes, breaking up the thermal signature, just as visual camouflage does with the visual signature.

They also employ layers and bulk to disperse collected heat and put materials that cool very quickly farther from the body. This space enables materials with heat-reflective properties to put cooler material between the soldier’s body and the thermal imaging sensor.

Seeing Through Walls – Thermal imaging does not enable you to see through walls, but it can give the impression to the uneducated since you pay be able to tell where studs or pipes are in walls because of heat transfer. But that is different than seeing though walls.

The less thermally-reflective a material is, the more contrast you will detect. Through-The-Wall-Sensor (TTWS) Technology uses doppler radar to detect people though walls. Devices like the $6K RANGE-R used by some military and law enforcement can penetrate most building materials to sense a living person is inside, but it does not penetrate metal, so I suppose that is one more reason to shield your home against EMP … or at least install some aluminum siding.

TTWS radar does not display a picture. Instead it indicates direction and distance.

Detecting Footprints – Under certain conditions, thermal imaging can, indeed detect heat transfer from footprints. Best case would be that you were standing in one place for a time on a cold floor in bare feet. Under these conditions, plenty of thermal transfer takes place.

Another condition would be if you exited a heated vehicle and walked very slowly and the person with the camera was following close behind. However, this becomes more difficult when the subject’s boots are close to the temperature of the ground and moving quickly since very little heat transfer would take place.

The footprints, if even detectable, could disappear too rapidly to be seen. So, thermal imaging is of far less use in this application than Hollywood would lead moviegoers to believe.

Thermography Facts

Day or Night - Since thermal imaging cameras detect and display images of radiation in the long-infrared range, they work both day and night, whether there is light or not.

Everything Emits IR Radiation - All objects emit infrared radiation if their temperature is above absolute zero, so thermal imaging cameras detect most objects to which they have an unobstructed line of sight.

Contrast - Warm blooded animals and people typically stand out against a cooler or warmer background. The exception is when body temperature and the temperature of the environment are both in the same range.

Accuracy - Accuracy is typically around +/- 2% so most thermal imaging cameras cannot detect tiny differences in temperature that could be detected with a contact thermometer and the further you are from the lens, the more difficult it be becomes to differentiate a difference of a couple of degrees.

Capability Varies Greatly - Not all thermal imaging camera are created equal, so when someone shows you a 'proof' photo that a technology tricks thermal imaging, ask what camera it was taken with and check out the specs.

A $6K handheld unit with 320 x 240 resolution might detect an animal a mile away, but more expensive FLIR units used by the border patrol may detect a person at 6 or even 20 miles away, depending on the model.

Technology is sure to improve, but you would rather have the Marines after you because their cameras are not that great. If you get Tier 1 SF hunting you, they have better equipment.

This article has been written by Cache Valley Prepper for Survivopedia.

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