

YOU CAN'T HIDE YOUR HEAT

If it's a threat, it's hot!



Security professionals have many different clubs in their professional bags. From cameras to ID badges, we have lots of things we can use to control access to the facilities we protect. As professionals, it is incumbent upon us to stay abreast of the latest technological developments in our field, and I'm here to tell you – there's a new game in town: thermal security cameras.

Unlike the human eye, thermal imagers don't use visible-light to make a picture, they use heat. This gives thermal security cameras distinct advantages over low-light and daylight cameras when lighting is impractical, too expensive or where long-range performance is required. For years, thermal security cameras have been seen as too expensive, so we have made due with less expensive – and less capable – options, like night-vision devices and infrared illuminated cameras. Why? With high-quality thermal security cameras on the market for under \$5,000, if we don't take a hard look at this technology we are selling ourselves, and those who pay us to keep them secure, short.

Why do I care?

The short answer to this question is...range. And, in this business, range equals time: time to react, time to adjust, time to respond. Thermal security cameras detect the minute differences in heat that are all around us, all the time. This heat energy is easier to detect over longer ranges than visible light, giving thermal cameras a distinct advantage. In the picture to the right, the thermal cameras clearly show someone trying to break into a car (top), and a small boat (bottom). The corresponding infrared illuminated camera and the night-vision device might as well be looking at the inside of a cow.

But that's not where the thermal advantage ends. Not only can thermal security cameras see from further away, they are not vulnerable to the most common countermeasure open to someone trying to avoid detection with a camera that depends on visible, or reflected, light: camouflage. Why? Simple: you can't hide your heat.

The infrared illuminated camera in this image was less than 50 feet from a person dressed in dark clothes on a moonless night and it came up empty. The same thing happens with the night-vision camera – nothing. But the thermal security camera picks out the intruder easily.

Sure, you might say, but with the infrared illuminated camera you can identify your intruder better than with the thermal camera. True, but face it: if an intruder is so close to your infrared illuminated camera that you can identify him, you're going to be looking for a new job and he's probably eating at your snack bar. Use a thermal camera, and identify your intruder when he is in handcuffs.

Thermal security cameras are useful in circumstances that relegate other camera technologies to fighting for second-place. Large facilities commonly have to deal with unfenced and unlit perimeter areas for economic reasons. Thermal cameras can see far enough to make this a non-issue, and they can do it for less money than it would take to install the infrastructure required for lowlight and infrared illuminated cameras.

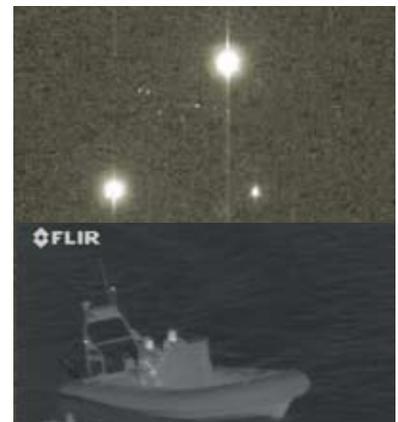
How does it work?

This may seem unbelievable, but really – this isn't rocket science; it comes down to some basic physics.

We see reflected light. Infrared illuminated cameras, night-vision devices, and the human eye all work on the same basic principle: light energy hits something and bounces off



These images demonstrate the utility of NVGs (above) and thermal security cameras (below) in a no-light situation.



These images demonstrate the utility of Infrared Illuminated cameras (above) and thermal security cameras (below) when viewing the same target in a low-light situation at ranges beyond 50'.



This illustration demonstrates the relative strengths of each imaging technology. NVGs (top) and Infrared Illuminated cameras (center) both require outside illumination which weakens as it nears the camera. Thermal security cameras (bottom) generate images regardless of available visible lighting, and do not lose strength nearly as rapidly as the other two technologies.

it; a detector then receives it and turns it into an image. The ability a given detector – be it in an eyeball, or a camera – to create that image is directly related to the amount of light available.

At night there isn't any sunlight to bounce off anything, so we're limited to starlight, moonlight and artificial lights. If there isn't enough, it's hard to see. Infrared illuminated cameras compensate for this by transmitting energy that bounces off whatever is in the camera's view and making a picture out of that. Unfortunately, severe range limitations result because reasonably powered illuminators are weak and the range performance of anything that relies on reflected light energy is limited by the strength of the energy being reflected.

Why? Think about it – the energy squirted out of those little bitty illuminators has to go to the target and back before the camera can have a chance of detecting it. Unfortunately, those poor little photons just don't stand a chance past about 50 feet. By the time they get to the target, they've had enough and just scatter off into the ether. (Besides, if you installed illuminators strong enough to perform like a thermal camera you'd probably turn your plant into a big toaster oven.)

Like your eye, infrared illuminated cameras work by detecting reflected light energy. Also like your eye, you will get better performance out of these cameras if the object you are looking for has lots of contrast compared to its background. If it doesn't, you won't see it. Know another word for that? Camouflage. That's right; camouflage is essentially just a way of decreasing the visible contrast between an object and its surroundings.

Thermal security cameras suffer from none of these drawbacks. First, they have nothing to do with reflected light energy: they see the heat given off by everything under the sun (literally!). Everything you see in normal daily life creates heat energy – day and night, in good weather and bad. Just think: as you are sitting there reading this article, you are making a perfect thermal signature all by yourself.

What's more the signatures of people, cars, buildings and all the other things seen by thermal security cameras generally have better contrast at night than during the day. They work just fine during the day – as long as there is the tiniest bit of temperature contrast between a target and its background, you can see it – but, they work great at night. And nighttime, as we know, is when the poop will most likely hit the paddles.

So, what have we learned today? We've learned that night-vision devices and infrared illuminated cameras have severe range limitations, and that this is a by-product of their reliance on reflected light energy. We've also seen that these cameras are at their worst when we need them most – at night! On the other hand, we've also seen that thermal security cameras create images from heat that is always there, that it produces its own contrast, and that they work best when we need them most.

Finally, and most important, we've learned there is only one word to describe a facility without thermal security cameras guarding its perimeter: target.



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