Ascendent White Paper on Range Performance

Detection, Recognition, and Identification (DRI) are terms we hear daily. This paper will explain the standards that have been set in place by The Night Vision Thermal Imaging Systems Performance Model, also referred to as the Johnston criteria, the universal standard for measuring thermal cameras

What is it?

DRI is a universally accepted set of standards providing a means of measuring the distance whereby a thermal sensor can produce an image of a specific target. This tool was developed by the US Army and takes into consideration many different criterion such as noise, array size, optical blur, lens depletion, aperture, atmospheric depletion, detector pitch and many more.

Detection (human)

Detection

Detection means that you will be able to see the target, however it will be little more than a blur. Specifically it means that the target is visible on at least one pixel, and that there is a good chance that the target is actually something of suspicion.

Recognition (human)

Recognition

Contrary to popular belief, recognition does not mean that you can recognize an individual. Recognition simply means that you are able to recognize an object's class (human vs car, truck vs tank, etc).

Identification (human)

Identification

Identification of an object means that you are able to differentiate between objects. For example, being able to identify the exact type of vehicle not just its class.

Putting it all together

If we ignore the effects of the atmosphere, normal recognition would be 25% of the detection and identification would be 12.5% of the detection range. Weather is almost never ideal so in reality these percentages are almost always reduced.

It's all in the pixels...

As you can see the terms detection, recognition, and identification can be extremely misleading, especially to end users and the public who do not have a military or electro-optics background. The terms detection, recognition, and identification do not relate to performance, but rather are calculated based on their pixel counts. To put this in perspective, an iPhone 5 has a resolution of 1136 x 640 which is over 725,000 pixels. Human detection only requires 3.6 x 1 pixels and human identification only requires 28 x 8 pixels; which is an extraordinarily small amount on the screen that can easily go unnoticed by the human eye.

"Ideal Conditions"

Another thing that is often not mentioned is that these ratings are based on what is termed "ideal conditions" which rarely happen in the real world. The average environmental application will get 25% less than the distance that the thermal camera is rated for and in extreme conditions can be less than 90%. Ascendent wrote this white paper to give end users the ability to understand the actual performance they can expect from these ratings. While Ascendent offers thermal imagers, we also offer active IR, SWIR, and visible sensors; we do not limit our clients to any one technology rather we custom build solutions that work for our customers.

Industry Standards

The Johnson Criteria assumes that the critical dimension for a human being is 0.75 meters.
To get DRI, you need 1.5 pixels, 6 pixels and 12 pixels across 0.75 meters in the object pane.

	Detection	Recognition	Identification
Human			
	3.6 pixels by 1 pixel (Something is there) 1.5 pixels / 0.75m = 2 pixels per meter	**13 pixels by 5 pixels** (A person is there) 6 pixels / 0.75m = 8 pixels per meter	**28.8 pixels by 8 pixels** (The person looks like a soldier) 12 pixels / 0.75m = 16 pixels per meter
Vehicle			
	2.8 pixels by 1 pixel (Something is there) 1.5 pixels / 0.75m = 2 pixels per meter	**13 pixels by 5 pixels** (A vehicle is there) 6 pixels / 0.75m = 8 pixels per meter	**28.8 pixels by 8 pixels** (The vehicle may be a humvee) 12 pixels / 0.75m = 16 pixels per meter
Boat			
	4.5 pixels by 1 pixel (Something is there) 1.5 pixels / 0.75m = 2 pixels per meter	**18 pixels by 2 pixels** (Some kind of boat is there) 6 pixels / 0.75m = 8 pixels per meter	**36 pixels by 4 pixels** (The boat is a small inflatatble boat) 12 pixels / 0.75m = 16 pixels per meter