VELUX.–COMBAT IDENTIFICATION EVOLUTION

BACKGROUND

Military forces throughout history have utilized Combat Identification (IFF) to minimize the instances of fratricide on the battlefield. Today's combat theatres are no exception and the modern Combat ID requirement can be summarized as:

- Highly lethal 'fires' from mixed forces on today's nonlinear battlefield substantially increases the threat of IFF and the need for positive identification of battle field assets
- Need for a "line of sight" identification solution is paramount.
- Need for cost effective solutions that can be applied to all battlefield assets
- No or minimal training requirements
- Simple deployment

While the modern requirement is essentially unchanged from its historical predecessor, the technology of today's battlefield has significantly evolved giving rise to an environment where:

- Ability to deliver accurate 100% lethal force has dramatically improved
- Battle lines do not exist increasing the confusions of Asset VS Threat
- Vast amounts of battlefield information coupled with an increased probability of conflicting reports can lead to blue on blue

Correct visual recognition as a final measure of identification is critical for the weapon operator. The weapon operator makes the final call.

Current Combat ID solutions utilize uniform, passive IR, electronic IR, passive thermal, and to a lesser extent active thermal to mark friendly assets on the battlefield. While these solutions address the requirement, two significant problems exist which undermine their effectiveness. These are:

Marked Assets can be seen by both friend and enemy

Current IR Markers broadcast at 880 nanometer (nm). These 880nm transmissions can not be seen with the naked eye, however they can be seen with virtually all deployed platforms of Night Vision Equipment (NVE) including the earliest generation one NVE devices.

While the US and NATO militaries benefited from a NVE monopoly on the battlefield, IR Markers worked superbly providing positive confirmation of marked assets, however recent conflicts have in limited instances discovered today's insurgent / militia adversaries with NVE.

Insurgent NVE is typically either US / NATO NVE recovered from the battlefield or low cost commercial units that have been acquired. Regardless of the source, the problem exists that US and NATO adversaries have in limited instances gained the ability to identify as well as emulate friendly assets.

Thermal Imaging equipments ability to see thermally marked assets is significantly effected by the sophistication of the equipment, operator experience, environmental conditions and viewing platform.

In recent years Thermal Imaging Equipment (TIE) use on the battlefield has dramatically increased. Technological advancements in TIE software and sensors provide the ability to highlight personnel, even when camouflaged, making TIE one of today's most critical battlefield assets.

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Rev Date 8/2009

Unlike NVE the sophistication of battlefield deployed TIE varies considerably. Certain TIE systems have the ability to highlight thermal sources (personnel) at considerable range while others are limited in their effective range to less than 100 meters. Similarly the ability to recognize actively or passively marked assets at varying ranges is also impacted by the sophistication of the TIE in use. Active and passive marking devices have employed various technologies in an effort to enhance their TIE recognition, however this has been met with limited success due to the variety of TIE systems in use. Currently a uniform or consistent method of TIE marking does not exist which in turn has created the situation where no thermal marking technology can apply to all TIE systems. While the variation of TIE systems is a critical factor in the success of TIE marking, the situation is worsened by two other factors; TIE software and environment.

TIE software continues to evolve providing increased detail, resolution and reduction of extraneous thermal noise and reflections to provide the operator with the best thermal image possible. While these TIE software advancements improve the displayed image in certain instances marking devices are filtered from being displayed because they are interpreted as extraneous noise. Historically the rule of thumb was that the more expensive and advanced the TIE system, the better the chance at seeing the marking system. Today this is not the case since some of the most expensive airborne platforms are filtering out some of the newly developed marking systems. It is however universally accepted that thermal systems today are better at identifying personal than they ever have been in the past.

Environmental or weather conditions significantly impact the performance of TIE systems. Humidity, temperature, clear sky vs. overcast sky, and even weather conditions observed over the previous 12 hours all effect TIE performance and the displayed image. Military helicopter crews often report that the same terrain will look completely different from day to day effected solely by that days weather. The TIE systems software continually works to normalize these images for the operator, however, as noted above this can lead to marking systems being filtered by the system.

For thermal marking to serve as a Combat ID platform on today's battlefield, the implemented marking solutions performance must be thoroughly understood and tested against the TIE system deployed along side the marking system. This must be continuously reevaluated to ensure that TIE operator understands how to recognize the marking system. This is not a simple solution and it requires constant training of TIE operators.

SOLUTION APPROACH – SWIR

Today s operators would ideally like to have the portability, ease of use, effective range and reliability of today's Phoenix beacon series marking platform coupled with the security of knowing that opposing forces can not view the marked positions and personnel.

Cejay Engineering's Velux Short Wave Infrared (SWIR) solution provides the portability, battery life, size, weight and ease of use of the Phoenix beacon series with the security of a marking signature that can not be seen with conventional 880nm NVE. The Velux series of programmable and synchronizeable beacons range in output frequency from 950nm to 1550nm. This output frequency has been tailored to coincide with the newest 950nm range military only NVE equipment being developed as well as some airborne platforms that can view IR in this range.

The Velux product suite was first developed and deployed to the intelligence community in the late 90's where it was a resounding success. The product suite has been reengineered around a more cost effective package ideally suited for military deployment. The Velux beacon series can be deployed selectivity by operation or mission thus providing an additional level of security for operational personnel

Cejay Engineering is actively partnering with NVE manufacturers to provide NV intensifier technology that can be retrofitted to existing deployed Night Vision Goggles that can view the 950+ nm range.

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