

Laser Decoy System for Small Ground Platforms

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Introduction: Increasingly, U.S. Navy ships are operating in the littorals, where they may be exposed to a variety of threat weapons including laser-directed threats. These laser-guided threats are also of very high concern to the Marines as they operate lightly armored vehicles in hostile areas. A laser decoy concept was developed demonstrating a capability to counter these types of threats. With relatively small-sized vehicles, the laser decoy needs to be compact and affordable. Short threat alert times dictate a very rapid response from the laser decoy. These constraints were met in the laser decoy that was developed and demonstrated as part of the EWISSP (Electronic Warfare Integrated System for Small Platforms) project.

One of the Office of Naval Research (ONR) Future Naval Capability (FNC) programs, EWISSP was developed as a low-cost integrated system to improve the survivability of small surface platforms against precision guided threats. The EWISSP design included sensors to detect the threat, processing to classify the threat type, and countermeasure responses to negate the effectiveness of the threat. The small platforms with small crew size can be protected with the automated operation of EWISSP. Although the Marines' Expeditionary Fighting Vehicle (EFV) was the initial transition target for the EWISSP technology, the system was designed to work with the full array of small surface platforms including the Light Armored Vehicle (LAV), the Landing Craft Air Cushion (LCAC), and the Landing Craft Utility (LCU) ships. EWISSP was jointly developed by a team including ONR, NRL, and Northrop Grumman. The NRL focus was in the development and demonstration of the Laser Coun-

termeasure (LaCM) to detect, identify, and counter laser-guided threats to the small surface platforms.

LaCM Description: Laser-guided weapons are precisely directed by an operator who illuminates the intended impact point with a laser beam. Guidance logic in the weapon detects this pointing laser reflection from the intended target and corrects the weapon's trajectory to impact the illumination point. A first step to countering these threats is to detect that the pointing laser designator energy is illuminating the defended platform. For this demonstration, the Goodrich Company's laser detection sensor was combined with signal processing logic to alert the EWISSP system to an attack.

Major LaCM components included a countermeasure laser to confuse the threat weapon, an optic combination to direct the LaCM laser energy toward the threat, and an erectable 2-meter mast to provide an improved defensive geometry. On alert of an attack, the LaCM mast is deployed from a stowed position that maintains the platform's relatively low profile. Next, the LaCM beam is configured by optics at the top of the mast to direct the countermeasure energy. This is followed by transmission of the energy from the LaCM laser to jam the threat sensor, preventing the threat weapon from hitting the targeted platform. Figure 8 illustrates the LaCM countermeasure concept that presents both omnidirectional and spot ground jamming beams that can counter the full range of laser-guided threats.

LaCM Testing: As part of the testing, the LaCM defended platform was attacked by threat seekers carried on a helicopter. The helicopter flew a full range of trajectories representative of those typically followed by threats. Figure 9 shows the LaCM hardware with the mast erected on a surrogate HMMWV (High Mobility Multipurpose Wheeled Vehicle) test platform

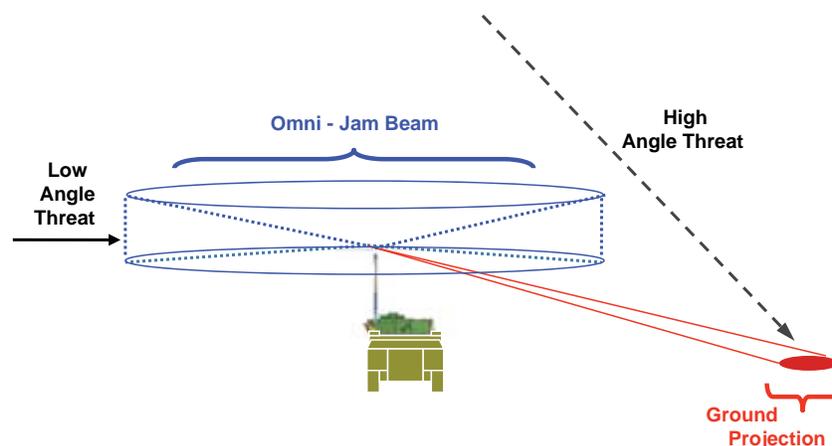
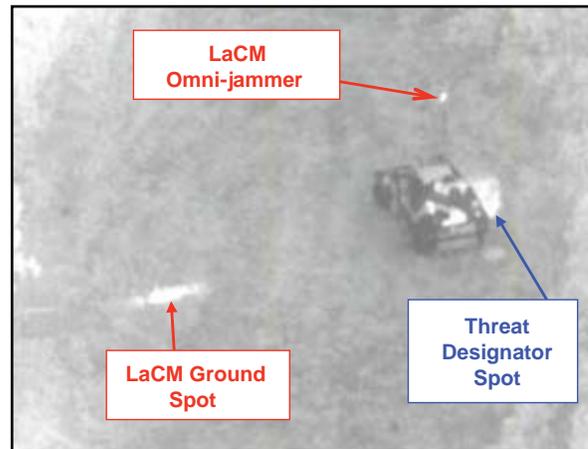


FIGURE 8
Laser Countermeasure (LaCM) concept.



FIGURE 9
LaCM testing with captive seekers on helicopter.

FIGURE 10
Reference infrared image of LaCM testing.



along with instrumented threat seekers installed on a test helicopter. This testing covered a wide range of backgrounds and attack geometries. A representative scene presented to the threat seekers is presented in the infrared image of Fig. 10. The center of the LaCM omni-jammer is seen as the small dot. The ground spot from the laser decoy lures the threat away from the HMMWV that is being illuminated by the threat's laser designator. During the testing, the LaCM was highly

effective in countering the threat seekers over a full set of engagement geometries.

Summary: The helicopter testing followed an extensive test series that was conducted at multiple test sites with many climatic and background conditions. In all of the tests, the concept was demonstrated to effectively counter the precision laser-guided threats.

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