

The ODIN Shipboard Laser: Science Fiction No More



The U.S. Navy installed the first Optical Dazzling Interdictor, Navy (ODIN), a laser weapon system that allows a ship to counter unmanned aerial systems, aboard the Arleigh Burke-class guided missile destroyer USS Dewey during a recent dry-docking. Chris Cavas

The engineers behind the development of so many cutting-edge U.S. Navy systems have long dreamed of creating a laser weapon that could defeat the fleet's enemies. Now, they may be closer than ever to making that dream a reality.

Earlier this year, the Navy installed the first Optical Dazzling Interdictor, Navy (ODIN) on the Arleigh Burke-class guided missile destroyer USS Dewey.

The system came out of Naval Surface Warfare Center (NSWC) Dahlgren Division in Virginia as part of Program Executive Office Integrated Warfare Systems, and it promises to radically change the way the Navy responds to a variety of threats at sea.

Check out the digital edition of the June Seapower magazine [here](#).

NSWC Dahlgren is the same group that worked on the Laser Weapon System (LaWS), which had a similar purpose: blasting unmanned aircraft out of the sky with a concentrated beam. Perhaps “dazzling” is a more accurate way to describe what LaWS does to airborne drones.

LaWS was a 30-kilowatt laser that was installed on the amphibious transport dock USS Ponce in 2014. It underwent a few years of testing and experiments but ultimately never was slated for operational use. LaWS did provide a lot of the

lessons learned for the latest generation of ODIN.

"[ODIN is] one of those cases where a naval warfare center was pretty much the main agency responsible for it, and it seems to have worked out pretty well."

Bradley Martin, senior policy researcher, Rand Corp.

ODIN took just two and a half years for the Navy to move the system from an approved idea through design, construction and testing to actual installation aboard the Dewey – a notable achievement in defense program development.

"The Pacific Fleet Commander identified this urgent counter-intelligence, surveillance and reconnaissance need, and the chief of naval operations directed us to fill it as quickly as possible," said Cmdr. David Wolfe, head of the directed energy program within the Integrated Warfare Systems program executive office.

An Infant System More Advanced Than Its Predecessors

The ODIN program is still in its infancy, but the Navy hopes to roll it out with other ships in the fleet over the next couple of years. The sea service is concerned with the growing prevalence of enemy unmanned aircraft and seeks ways to counter this threat.

The Navy hopes to learn lessons from the installation of ODIN on the Dewey, which will inform commanders about how the system could be implemented on other ships in the future. ODIN, like LaWS, could lead to the development of other laser weapon systems.

The Navy requested \$299 million for shipboard laser systems in its fiscal 2019 budget.

Bradley Martin, a senior policy researcher at the Rand Corp., said ODIN is not going to be used like laser weapons you would

see in science fiction movies, but rather as something that would scramble a unmanned aerial vehicle's optical sensor. UAVs right now aren't a threat to attack a ship, so destroying them quickly isn't necessary.

"Typically, a UAV is not going to be used as a striking kind of weapon," Martin said.



An artist's rendering of the High Energy Laser with Integrated Optical-dazzler and Surveillance (HELIOS) system at work. HELIOS, developed by Lockheed Martin, is another laser system that bears close observation. Lockheed Martin

Instead, the laser would cause a drone to "lose its way" and eventually crash because it loses the ability to target and navigate. Any adversary using the drone to conduct surveillance of Navy activities would lose access to that asset.

Martin said that laser weapons have shown increasing maturity in recent years.

"Based on everything I've seen, [ODIN] is well-developed and on its way to being delivered," he said. "It's one of those cases where a naval warfare center was pretty much the main agency responsible for it, and it seems to have worked out pretty well."

Cost-Effective Solution Best Suited for Smaller Surface Combatants

This type of system is best suited for surface combatants like cruisers and destroyers. Theoretically, it could be put on any class of ship, but ODIN is not a point-defense type of weapon so installing it on other types of vessels might be counterproductive, Martin noted.

The ultimate scenario when it comes to lasers for anyone in Navy leadership is a powerful laser weapon that would be

precise in targeting and capable of destroying enemy craft without the need to use expensive munitions that cost millions for each shot. But the technology appears to be nowhere near that kind of capability.

However, as ODIN shows, this is not the only way to make lasers useful as weapons. ODIN works by emitting an infrared light that interferes with electronic sensors. This disrupts a drone's ability to target or even navigate, which can cause a threat to crash harmlessly into the water.

ODIN will have some of the same limitations all lasers have: rain, smog and smoke could limit its effectiveness, but it's another tool in the Navy's toolbox.



Other systems such as the Laser Weapon System (LaWS), a less powerful directed energy device, and the U.S.-Israeli Tactical High Energy Laser (THEL) have been developed but abandoned. LaWS was ruled out of operational use and THEL (pictured) was used by the U.S. Army to shoot down rockets and artillery shells but was canceled because it was too bulky, too expensive and didn't yield effective enough results. U.S. Army ODIN has turned out to be a cost-effective weapon in a number of ways. Devoting power to a laser is less expensive than destroying an aerial threat such as a drone. Also, the system was developed rapidly and for not a lot of money (at least by Defense Department standards).

"It's a well-developed concept and something that's in the millions – not many millions – of dollars, and it could be used across the fleet," Martin said.

He added that he believes we'll see widespread use of this kind of technology in the Navy within a couple of years. "It's an urgent need, and it could be used in very short order," he said.

Martin called it a "good news story" for the Navy.

“A lot of the things they develop, it takes a long time and has to go to somebody outside the Navy to do the work,” Martin said.

Other systems in addition to ODIN are worth watching. With the Navy, Lockheed Martin has been developing the High Energy Laser with Integrated Optical-dazzler and Surveillance (HELIOS) system. HELIOS recently underwent a successful critical design review and could itself be installed on a destroyer.

“HELIOS will provide an additional layer of protection for the fleet – deep magazine, low cost per kill, speed-of-light delivery and precision response,” Brendan Scanlon, HELIOS program director at Lockheed, said in a statement. “Additional HELIOS systems will accelerate the warfighter learning curve, provide risk reduction for future laser weapon system increments and provide a stronger demand signal to the supply base.”