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Watch Navy's New Laser Cannon, Mounted on a Ship, Kill a Drone

By [Spencer Ackerman](#)

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The video above is what the Navy's top officers view as the future of their dominance on the surface of the world's waterways. A laser cannon, its magazine limited only by the amount of energy pumped into it and costing pocket change to fire, punching through an adversary's cheap anti-ship weapons — at the speed of light.

Long in testing and even older in ambition, the chief of naval operations, Adm. Jonathan Greenert, triumphantly heralded the dawn age of the shipboard laser gun during the Navy's annual conference outside Washington. In tests aboard the destroyer *USS Dewey* last summer off the California coast, the Laser Weapon System successfully shot down surveillance drones and fast boats in its first round of sea trials aboard a surface combatant, according to Rear Adm. Thomas Eccles, one of the Navy's top engineers. (Three of the shoot-downs were aboard the *Dewey*, while nine others happened on shore, Eccles clarifies.) "This system," Greenert told the naval community at the Sea Air Space conference, showing the above video to a hushed crowd, "it works."

The tubular Laser Weapon System (LaWS) is a solid-state laser that's been in development for six years, at a cost of \$40 million. It's a [directed-energy descendent of the the radar-guided Close In Weapons System \(CIWS; it rhymes with "Gee Whiz"\)](#) gun already aboard surface ships. In December, following the successful *Dewey* tests, Greenert ordered the laser "out to the fleet for an operational demonstration," said Rear Adm. Matthew Klunder, the Navy's chief of research. And so next year, LaWS will have its trial by fire, when the Navy [puts it on the deck of its new afloat staging base *USS Ponce*](#) for its maiden voyage to the Middle East.



The Laser Weapon System (LaWS), shown here on the guided-missile destroyer USS Dewey. Photo: U.S. Navy

It just so happens that the LaWS' ability to track and kill surveillance drones and swarming fast boats matches with Iran's [development of surveillance drones](#) and [swarming fast-boat tactics](#). And it just so happens that the *Ponce* will spend most of 2014 deployed in Iran's backyard.

"Any country that operates the kinds of threats this system is designed to deal with should pause and say, 'If the United States Navy can take a challenge like that and muster the scientific expertise from industry, academia and inside the government and pull together a solution that can be fielded as rapidly as this one's been fielded, and go from a test environment directly to a forward-deployed unit for demonstration in the field and in the Fifth Fleet,'" Eccles said, "they should recognize that when we say 'quick-reaction capability' we truly deliver on a quick reaction capability."

Within initial limits. The Navy won't say just how many kilowatts of energy the LaWS' beam is, but it's probably under the 100 kilowatts generally considered militarily mature. The fact that LaWS can kill a surveillance drone and a fast-attack boat has more to do with the vulnerabilities of those systems than it its own prowess. It cannot stop an anti-ship missile, and its beam, about the circumference of a dime, will do little more than singe a fighter jet. And there remain significant challenges with cooling a shipboard high-energy laser, a necessary safety feature.

But Greenert, Eccles, and Klunder are confident that the next wave of Navy lasers will be more powerful. The laser programs, long in development, lacked focus for years: should the Navy do the harder work of developing a vastly more powerful [Free Electron Laser](#); or get the less impressive but more practical solid-state lasers into the fleet first? The threat of a

[congressionally-mandated death](#) helped answer the question in favor of the latter, which use crystals or glass to generate their beams — as did a [successful 2011 test](#) with a different laser system on a ship.

Integrate the lasers on ships today, the Navy's thinking goes, and they'll become lasting features aboard the cruisers, destroyers, afloat staging bases and other surface ships of the future, in increasingly powerful variants. Sailors on the *Ponce* will be using the LaWS, not lab technicians, allowing them to generate tactics, techniques and procedures for laser weaponry; and integrating the lasers into the other systems on the ship.

The LaWS presently generates its own power. "As we move into future fielding, the opportunity is there to go into the ship's power grid," Eccles says — a key step to eventually scale up to a megawatt's worth of power, which can burn through [20 feet of steel in a second](#). Generating that level of power, still an engineering challenge, *will* allow the Navy to neutralize anti-ship missiles and fighter jets. Klunder said he believes that while getting up to a megawatt is "certainly part of a longer-term future, there's a power level significantly less than that that will give us greater effects" against similar challenges.

But the biggest advantage that Eccles and Klunder advertise for the age of the laser weapon is financial. "We're not talking about something that costs millions of dollars or multi-thousands of dollars," said Klunder. "We're talking something — and this is true data; remember, I'm a test pilot, so I deal in data, I don't deal in PowerPoints, I deal in real performance data — we're talking about a pulse of directed energy that costs under a U.S. dollar." Greenert beamed as he noted that the Navy's shipboard gun and missile arsenal, at its cheapest, costs \$5,000 per shot.

A lot about that cost figure depends on successful integration aboard a ship's deck; successfully drawing from a ship's power without compromising the propulsion systems; and the cost of fuel per shot. And it also factors out the cost of the weapon itself. But if it turns out to be genuine, the Navy will have developed the rare high-end weapons system that undercuts the cost of adversary weapons.

The big concern in surface warfare is that [anti-ship missiles are way cheaper than ships](#). The Navy can't make ships cheaper. ([Let's be real](#).) But it might be able to develop a countermeasure to those anti-ship weapons cheaper than those weapons themselves. "I have the ability now, with a directed energy pulse weapon, to take out something that may cost millions of dollars, or multi-thousands of dollars, with a weapon round that costs about one dollar to shoot," Klunder said.

As the Navy sees it, that's the ultimate promise of laser guns: a weapon that undercuts the increasing cheapness and availability of powerful missiles and robots. It's by no means certain that the Navy can realize the promise. But it's now fully committed to trying.

"Could, someday, [the LaWS] be missile defense? Perhaps," Greenert said. "I want to get it out to the environment so it can one day deploy."



Danger Room senior reporter Spencer Ackerman recently won the [2012 National Magazine Award for Reporting in Digital Media](#).

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