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China's Laser Weapons: Future Potential, Future Tensions?

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Synopsis

China's increasingly sophisticated laser weapons arsenal is becoming a source of concern for its strategic rivals. What are their future potential?

Commentary

IN MAY 2018, the United States Department of Defence lodged a formal protest to China regarding a series of incidents in Djibouti where military-grade lasers were directed at US aircraft from China's naval base, some 13 kilometres from Camp Lemonnier, the US' only permanent base in East Africa. In one event, the pilot and co-pilot of a US Air Force C-130 Hercules were dazzled with lasers and sustained minor eye injuries.

Spokespersons for China's Ministry of National Defence and the Ministry of Foreign Affairs however have categorically denied US claims, labelling the concerns as "untrue criticisms". Meanwhile, rhetoric has been heating-up in the public opinion sphere. US-based authors have criticised China's insincerity in working to resolve the lasing issue, while Chinese writers shot back at "false accusations" or outright celebrated the triumph of Chinese laser weapons over "arrogant Americans" spying on China's naval base.

China's Strides in Laser Weapons Technology

Looking beyond the war of words, it must be admitted that China has made impressive strides in laser weapons technology. There are a few key questions that need to be asked: Why does China value advances in laser weapons technology? How does China classify its laser weapons? What laser weapons constitute China's existing arsenal? What is the future developmental trend of Chinese laser weapons?

As stated in Chinese military technology texts, laser weapons are valued because of speed, agility, precision, cost effectiveness, and anti-jamming properties.

First and foremost, laser weapons are fast and can strike at targets with the speed of light at 300,000 kilometres per second. Secondly, laser weapons are agile and in a short time span can intercept multiple targets or a single target multiple times. Thirdly, laser is highly directional and can hit designated points on the intended target with extreme precision.

Fourthly, laser is exceptionally cost effective when compared to conventional ammunition, with each laser shot costing as little as one US dollar. Last but not least, laser is strongly resistant to electromagnetic interference.

China's Strategic and Tactical Laser Weapons

The Chinese classify laser weapons into the strategic and tactical. Strategic or high-power laser weapon systems are space or ground-based that intercepts enemy intercontinental ballistic missiles and satellites. Tactical or low-power laser weapons are generally used for short-range air defence or self-defence for the individual warfighter or weapons platforms.

Besides dazzling enemy sensors and electro-optical devices — such as the JD-4 active laser defence system mounted on China's Type-99KM main battle tank that can dazzle enemy laser rangefinder and target designator — tactical laser weapons can also blind enemy combatants through harming the retina and cornea of the eye while sowing confusion and panic among enemy troops.

China is a signatory to the United Nations "Protocol on Blinding Laser Weapons". Although the law bans laser weapons that directly lead to permanent eye damage, it does not prohibit laser weapons that cause flash blindness.

In addition to its blinding function, laser weapons can also destroy enemy targets through high heat, shockwaves, and by causing secondary radiation that damages critical electrical components. According to the book *Electro-optic Ranging & Countermeasure*, written by three Chinese electro-optics specialists, destruction via high heat, better known as "heat damage," is the most common method of laser destruction.

The average melting point of a satellite, aircraft, or missile casing is around 1,500 Celsius. It usually takes three to five seconds for a high-power laser of two to three megawatt to melt or vaporise the casing.

China's Laser Weapons Arsenal

Based on the reports of Popular Science and South China Morning Post, we know that China maintains a diverse laser weapons arsenal.

There are two main categories of Chinese tactical laser weapons short-range air defence weapons and individual weapons. The former targets slow and low-flying

unmanned aerial vehicles, missiles, and aircrafts. Known complexes include the Low Altitude Guard I and II, The Silent Hunter, Guorong-I Anti-Drone System, and High Shield Comprehensive Optoelectronic Defence System. The effective ranges of these systems are between several hundred metres to 12 square kilometres.

Individual laser weapons consist of laser guns that dazzle enemy combatants or their electro-optical devices. In this category we have the BBQ-905 laser dazzler rifle, WJG-2002 laser dazzler rifle, PY132A blinding laser weapon, PY131A blinding laser weapon, and the WJ-1-050 portable laser dazzler weapon. According to analyst Sebastien Roblin, the BBQ-905 has the longest effective range of a thousand meters.

Apart from tactical weapons, China also has strategic laser weapons systems to intercept ballistic missiles and satellites thousands of kilometres away. In recent years, China has conducted interception exercises from bases in Xinjiang and Sichuan provinces and the results were reported to be "very satisfactory".

Preventing Unintended Conflict

Despite its advantages over conventional arms, the laser weapon is not without its shortcomings. Other than difficulties in tracking highly agile targets and destroying heavily armoured targets, adverse weather conditions, such as fog, rain, and snow can negatively impact the effectiveness of laser weapons.

Still, greater battlefield application of laser weapons is unavoidable in the future, especially for special forces, air defence, and missile defence. As the global presence of China's People's Liberation Army (PLA) expands, it is necessary for China and foreign countries to reach additional consensus regarding the use of laser weapons in order to prevent unintended escalation of conflict.

To Chinese specialists, the laser weapon is a low-cost and effective form of countermeasure especially in the electro-optical realm. Given China's growing technological sophistication in laser weapons, we should expect the unveiling of smaller and smarter laser armaments and the expansion of global demand for Chinese laser weapons in the near future.

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