

# Directed Energy Weapons

A directed-energy weapon (DEW) is a ranged weapon that uses highly focused energy to damage its targets. Lasers, microwaves, particle beams etc are examples of such a weapon.

Although decades of research has been conducted on the practical applications of such weapons, they are still believed to be in the experimental stage although a few prototypes have been claimed by certain countries to be operational.

The DRDO had announced in September 2020, that the organisation will be carrying out its own research into the feasibility of Directed Energy Weapons.

The details about Directed Energy Weapons will be useful for candidates writing the Civil Services Examination.

## History of Directed Energy Weapons

The first known use of DEW is a legend based on Archimedes using mirrors to direct sunlight to burn ships during the [Roman Empire's](#) war against his home-city of Syracuse. Modern historians have since expressed doubts about the veracity of such a claim.

Flash forward to [World War II](#) the, the German Army developed certain weapons such a sonic cannon that would cause fatal vibrations in the human body leading to nausea, vertigo etc. Weapon experiments using X-ray as a base were also conducted with an intent to pre-ionize ignition in aircraft engines and hence serve as anti-aircraft DEW

During the [Cold War](#) period, it was reported by the CIA that the Soviet army had used laser-based weapons against the Chinese during the many Sino-Soviet border clashes that took place but such claims have been disputed to this date.

When the Iraq War of 2003 broke out, electromagnetic weapons, including high power microwaves, were used by the U.S. military to disrupt and destroy Iraqi electronic systems and may have been used for crowd control.

## Types of Directed Energy Weapons

The following are the types of DEW's on which certain prototypes exist or claim to exist.

**Microwave weapons:** Any weapon which has a microwave range between 300 MHz and 300 GHz is a microwave weapon but there are some weapons that do not fit this description and yet are labelled the same. Some examples of weapons which have been publicised are as follows:

- Active Denial System, which is a millimetre wave source that heats the water in a human target's skin and thus causes incapacitating pain.
- Bofors HPM Blackout a high-powered microwave weapon that is said to be able to destroy at a short distance a wide variety of commercial electronic equipment.

**Particle-beam weapons:** Particle-beam weapons can use charged or neutral particles, and can be either endoatmospheric or exoatmospheric. Such weapons are possible in theory but its practical applications have not been demonstrated as of yet.

**Plasma weapons:** Plasma weapons fire a beam, bolt, or stream of plasma, which is an excited state of matter consisting of atomic electrons & nuclei and free electrons if ionized, or other particles if pinched.

**Laser weapons:** As the name suggests, laser weapons are based on laser beams fired from an apparatus. Although its offensive application haven't been demonstrated so far, it has been used in other auxiliary applications such as the designation of high-value targets for air-strikes and guiding missiles.

**Sonic weapons:** Sonic weapons or ultrasonic weapons, use sound as means to injure, kill or incapacitate a target. Its use and research are limited to use by military and police personnel.

### **Relevant questions regarding Directed Energy weapons**

#### **What are the advantages and disadvantages of a Directed Energy weapon?**

The advantage and disadvantage of a DEW are as follows:

##### **Advantage:**

- Such weapons can be deployed stealthily and if used right with comparatively less collateral damage.
- Logistical problems of procuring more ammunition are eliminated as the surplus amount of energy is all that is needed
- Cheaper to operate than conventional weapons depending on certain operational factors

##### **Disadvantage:**

- The research into DEW's is a financially draining task
- The practical applications of some DEW's are questionable
- Counter against such weapons is not hard to come by. For example, laser beams can be weakened by water vapour and dust.

#### **What are some of the known Directed Energy Weapons in use or claimed to be in use?**

Some of the DEWs currently (or probably) in use are as follows:

- Active Denial System (ADS), a non-lethal directed-energy weapon developed by the U.S. military, for area denial, perimeter security and crowd control.
- ALKA, possibly the first Directed-energy weapon to be used in combat by the Turkish armed forces
- MEDUSA, a non-lethal microwave-based weapon.