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Laser Ordnance Neutralization (Zeus) - Archived 7/2007

Outlook

- U.S. Navy has apparently moved ahead with other systems, such as smaller, cheaper robotic devices, to carry out ordnance neutralization missions
- No major production of Zeus expected for U.S. military
- Some prototype systems may still be in use in Iraq
- Barring any significant activity, this report will be archived next year

Orientation

Description. HMMWV-mounted solid-state laser for neutralizing surface mines and unexploded ordnance.

Sponsor

U.S. Army

Space and Missile Defense Command (SMDC)
Huntsville, Alabama (AL), USA

NAVSEA

Naval Explosive Ordnance Disposal Technology Div.
(NAVEODTECHDIV)
Indian Head, Maryland (MD), USA

Status. In development and testing.

Total Produced. At least two laser ordnance neutralization working prototype systems have been produced.

Application. System is intended for mounting on U.S. Army High Mobility Multipurpose Wheeled Vehicles (HMMWVs).

Price Range. As this program is technically in research and development, there is no direct unit cost associated with it. A prototype Zeus reportedly cost approximately \$3 million.

Contractors

Prime

Sparta Systems	http://www.sparta.com , Mill Creek Dr, Ste 100, Laguna Hills, CA 92653-1595 United States, Tel: + 1 (949) 829-9732, Fax: + 1 (949) 583 -9113, Prime
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Technical Data

Design Features. In the current, most viable manifestation of laser ordnance neutralization, the Zeus system uses a laser beam (in stand-off position) that heats the subject ordnance to such a level that detonation of the device occurs. The system uses a 500W, diode-pumped Nd:YAG laser with a range of 25 to 250 meters. It has recently been upgraded with an improved, 2-kilowatt laser.

Zeus includes a camera and display screen for surveillance. Operators use a joy stick to focus the camera, scan the field of attack, aim the laser, and fire. Operators make the typically invisible firing laser visible by co-boresighting a visible green double designator laser.

The system is designed to clear a variety of mines, including air-dropped land mines, surface-laid land mines, and artillery-launched land mines, as well as unexploded ordnance. One of the greatest attractions of the technology is that it can negate booby-traps that would otherwise confront personnel who would typically have to neutralize a bomb by hand.

Other critical components include laser safety glass for operators within the HMMWV, and air conditioning systems for equipment and personnel. GPS systems are also provided to aid in determining the exact location of ordnance.

Variants/Upgrades

There are no known variants at this time.

Program Review

Background. The U.S. began to conduct extensive tests of the laser neutralization of ordnance in the mid-1990s. These demonstrations were important in determining whether a laser system could be attached to a vehicle that would then, in turn, be used against various battlefield hazards. These early program efforts were initially funded by the U.S. Air Force at Eglin Air Force Base in Florida, reflecting a focused need by that service to develop new ways of maintaining clear runways from which to launch operations.

The increasing need for technologies to combat the problem of unexploded bombs has been dramatically illustrated by the work of the U.S. Naval Explosive Ordnance Disposal Technology Division (NAVEODTECHDIV), with which the developers of Zeus have established a partnership. One of NAVTECHDIV's major functions is to provide deployed disposal forces with critical information on the technical aspects of various ordnance before they attempt to neutralize the material.

With the ongoing war on terrorism and the focus in the U.S. on homeland security, requests to the division for information have steadily increased. During Operation Enduring Freedom in 2002, U.S. Explosive Ordnance Disposal (EOD) forces in Afghanistan called on the division to provide them with information on the extremely lethal BLU-118B thermobaric bomb. Of particular concern was determining how to deal with these weapons after they had become embedded in caves and failed to detonate. Clearly, recent years have seen not only an increase in the spread of unexploded

ordnance, but also an increase in the difficulty of dealing with it.

Interest in laser ordnance neutralization naturally grew significantly, and by the summer of 2000, testing and demonstration activity had increased markedly. Early demos of Zeus found that the power of the laser had to be improved to increase stand-off ranges. Upgraded, 2-kilowatt lasers were delivered to developers in June 2002 for testing. At the time, the program was reportedly receiving approximately \$4 million a year in RDT&E funding for a roughly two-year phase.

Underscoring the need for Zeus – or at least for some form of stand-off technology – was the sad news in April 2002 that three members of an Explosive Ordnance Disposal team had been killed in Afghanistan when a rocket they were attempting to neutralize exploded.

In August 2002, the U.S. DoD instituted an RDT&E funding shift that placed new emphasis on various laser technology programs – \$78 million was to be spent in FY03 on various defense-wide high-energy laser programs. While it was apparently not broken out as a separate line, Zeus R&D funding likely came from this pool – at least in part. Other possible sources of funding are mentioned in the **Funding** section below.

In December 2002, the U.S. Army put Zeus through its paces in a series of tests at the White Sands testing facility. A variety of munitions were tested, including two BLU-97 bombs, two 60mm mortars, and even two 40mm hand grenades. Over several months of testing, Zeus reportedly neutralized hundreds of munitions.

Laser Ordnance Neutralization (Zeus)

In March 2003, the only known Zeus system was sent by the U.S. Army to Afghanistan. In addition to all the ordnance dropped or placed during the recent conflict, there are still plenty of remnants from 20 years worth of wars requiring disposal.

Under the U.S. DoD's Explosive Ordnance Disposal/Low-Intensity Conflict (EOD/LIC) RDT&E program, more funding for laser ordnance neutralization has been provided. The FY05 defense budget, released in early 2004, included over \$10 million for technology development, including Zeus.

Adding impetus to the potential for Zeus, the U.S. Army Communications-Electronics Command (CECOM), in mid-2004, issued a Request for Information about technologies for stand-off mine clearance with the goal of contracts to follow.

It was reported in early 2005 that Zeus had once again been deployed to a war zone. This time, not surprisingly, the new zone of operation was Iraq.

Funding

The U.S. Army is believed to have spent over \$8 million on Zeus development to date. Renewed funding is currently the subject of debate. Zeus may, however, receive some funding under the U.S. Army's Landmine Warfare and Barrier Advanced Technology program (PE#0603606A). Although Zeus is not specifically mentioned in the FY05/FY06 U.S. DoD RDT&E budget, the funded Army program is described as seeking to advance the development of neutralization technologies, including laser approaches. A total of \$33.6 million was budgeted for PE#0603606A in FY05, and \$25.5 million in FY06.

Contracts / Orders & Options

No contracts for Zeus have been made public through open sources.

Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	1995	U.S. increases testing of laser ordnance neutralization
	2000	U.S. Army starts funding R&D of Zeus system
	2002	Upgraded, 2-kilowatt lasers introduced
Mar	2003	Zeus deployed to Afghanistan
	2004	U.S. defense budget includes \$10.9 million for laser ordnance neutralization development
	2004	Zeus deployed to Iraq

Worldwide Distribution / Inventories

The system is intended for **U.S. Army** forces only.

Forecast Rationale

At one time considered a promising tool in the fight against roadside bombs, the Zeus laser ordnance neutralization system may have instead been cast aside in favor of smaller, cheaper robotic systems, fully capable of carrying out the same mission for which

Zeus was intended. While no contracts for Zeus have been announced through open sources, numerous contracts have been awarded for the production of smaller, man-portable, fully developed robotic systems such as Talon.

Laser Ordnance Neutralization (Zeus)

While prototype Zeus systems might still be in use for practical purposes, as well as for evaluations, any major U.S. military procurement of the system seems unlikely at this point.

Barring any significant future activity, this report will be archived next year.

Ten-Year Outlook

No significant production expected for U.S. military.

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