



FACT SHEET

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ADVANCED TACTICAL LASER



The **Advanced Tactical Laser** is a major Department of Defense technology project receiving technical expertise and support from the Air Force Research Laboratory's Directed Energy Directorate at Kirtland Air Force Base, New Mexico. The Directorate is also developing advanced technologies that will eventually improve the aircraft's laser. Overall, the project involves the installation of a kilowatt-class chemical laser in a C-130H cargo aircraft, along with a battle management and beam control capability that will direct laser energy on targets to demonstrate the accuracy and lethality of an aircraft-based laser weapon.

In an operational role, a tactical aircraft-based laser weapon could provide a precision, speed-of-light destructive capability that could greatly reduce collateral damage.

The system uses a C-130H cargo aircraft that has been modified, with the most obvious visual difference being a rotating turret protruding from the aircraft's underside through a 50-inch-diameter hole. A laser beam can be focused and directed to a target through this turret.

A Chemical Oxygen-Iodine Laser, or COIL, invented by Air Force Research Laboratory scientists in 1977, is the heart of the aircraft-based system, producing the world's shortest wavelength (1.315 micrometers), high-power chemical laser. COIL uses an excited state of molecular oxygen, generated by a chemical reaction between chlorine gas and a mixture of hydrogen peroxide and potassium hydroxide (basic hydrogen peroxide). Molecular iodine is then injected and mixed with the gas flow, producing a chemical reaction that results in laser energy.

This chemical laser is similar to the one developed for the Airborne Laser, a Boeing 747-400 series jumbo jet whose chemical laser is larger, more powerful, and has a greater range. The Airborne Laser also vents its exhaust into the atmosphere. In contrast, the Advanced Tactical Laser traps its exhaust, allowing the laser to operate at any altitude. Later, that exhaust can be processed to get more laser firings. While the Airborne Laser is designed to eliminate attacking ballistic missiles at long ranges, the Advanced Tactical Laser would be striking at nearby tactical targets.

The aircraft's chemical laser was developed at the Boeing Company's Santa Susana Field Laboratory in Simi Valley, California; then torn down and shipped to Kirtland Air Force Base to be rebuilt and tested.

A retired, wingless C-130 aircraft was shipped to Kirtland in August 2004 to serve as a surrogate for the actual Advanced Tactical Laser aircraft to explore placement of the high-energy laser, optical and support systems. In January 2006, the actual aircraft flew to Crestview, in the panhandle of Florida, east of Pensacola, for modifications; completed through the Boeing Company by Crestview Aerospace Corp. The modifications included the installation of such flight demonstration hardware as a beam director and an optical control bench, both needed to direct the laser beam to a target. Also installed were sensors and weapon system consoles that display high-resolution imagery for tracking targets.



Surrogate C-130

The aircraft flew to Kirtland in late summer of 2006 to begin flight testing over the U.S. Army's White Sands Missile Range, south of Kirtland Air Force Base. All the Advanced Tactical Laser's subsystems will have been installed except for the high-power chemical laser. In its place will be a low-power solid-state laser that will serve as a surrogate for the system's high-power chemical laser. These tests will continue while the high-power chemical laser is completed and ground-tested at Kirtland. In 2007, the chemical laser will be installed aboard the C-130H and used in tests over White Sands using mission-representative ground targets.

In addition to the Directed Energy Directorate, there are other organizations involved in this program. The C-130H transport belongs to the 46th Test Wing at Eglin Air Force Base, Florida. The Boeing Company's Integrated Defense Systems in St. Louis, Missouri, is the primary contractor on the program, but also involved are L-3 Communications Brasher in Pittsburgh, Pennsylvania, the organization that made the turret, and HYTEC Inc. in Los Alamos, New Mexico, which worked on various structural elements.

This project is one of the Department of Defense's Advanced Concept Technology Demonstrations, a means to exploit mature or maturing technologies to solve military problems. Much of the work on the Advanced Tactical Laser is being done under a \$176 million Defense Department contract, awarded in December 2002 to the Boeing Company in Canoga Park, California.

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(Current as of August 2006)