



The Airborne Laser Test Bed

The Airborne Laser Test Bed (ALTB) is an advanced platform for the Department of Defense's directed energy research program. Using two solid state lasers and a megawatt-class Chemical Oxygen Iodine Laser (COIL) housed aboard a modified Boeing 747-400 Freighter, the ALTB demonstrates the potential of using directed energy as a viable technology against ballistic missiles.



Firing Sequence

- 1) The ALTB uses one of its six infrared sensors to detect the exhaust plume of a boosting missile.
- 2) A kilowatt-class solid state laser, the Track Illuminator, tracks the missile and determines a precise aim point.
- 3) The Beacon Illuminator, a second kilowatt-class solid state laser, then measures disturbances in the atmosphere, which are corrected by the adaptive optics system to accurately point and focus the High Energy Laser (HEL) at its target.
- 4) Using a large telescope located in the nose turret, the beam control/fire control system focuses the HEL beam onto a pressurized area of the missile, holding it there until laser energy compromises the missile's structural integrity causing it to fail.

Recent Experiments

- **On January 10, 2010**, the ALTB successfully engaged an instrumented rocket at the lethal demonstration range. This test was the first time the HEL performance data was collected at the target missile.
- **On February 3, 2010**, the ALTB successfully engaged and destroyed a boosting solid-fueled Terrier Black Brant (TBB) rocket.
- **On February 11, 2010**, the ALTB successfully engaged and destroyed a boosting liquid-fueled Foreign Military Acquisition (FMA) missile. On the same flight, it successfully engaged a boosting Terrier Black Brant rocket meeting all test objectives without negating the rocket.
- **On May 3, 2010**, the ALTB successfully engaged an instrumented rocket at twice the range of the first lethal engagement. The results of this experiment verified ALTB's ability to destroy an FMA at twice the first lethal demonstration range.
- **On September 1, 2010**, the ALTB successfully engaged a boosting liquid-fueled FMA missile at twice the range of the first lethal demonstration; however, it failed to achieve the primary mission objective of premature thrust termination when an interrupted data conversion led to an unsafe HEL beam pointing condition and terminated the engagement. The safety system successfully terminated the HEL firing before any damage or off target propagation occurred.
- **On October 20, 2010**, the ALTB successfully engaged a boosting solid-fueled TBB rocket. During tracking, the HEL incorrectly reported it was not ready to fire and aborted the engagement. The cause was traced to a single micro-switch on an iodine valve that incorrectly reported a closed-valve condition. The valves were subsequently replaced and new software procedures were implemented to ensure a single fault of this type cannot cause a system abort in the future.
- **On July 27, 2011**, ALTB completed a laser track of Minuteman III ICBM, marking the first ever laser track of an ICBM and the longest range missile track to date.
- **On August 11, 2011**, ALTB completed a passive track of a Minotaur IV Lite rocket (HTV-2b) in which it acquired and tracked (via IR) a boosting missile at over 500 km. Additionally, ALTB proved its ability to maintain a passive track through staging.

Future Plans

- ALTB continues to conduct flight test experiments in support of science and technology objectives. ALTB has conducted over ten science and technology flight test missions, collecting data on tracking and atmospheric compensation, system jitter, and boundary layer effects on propagation.