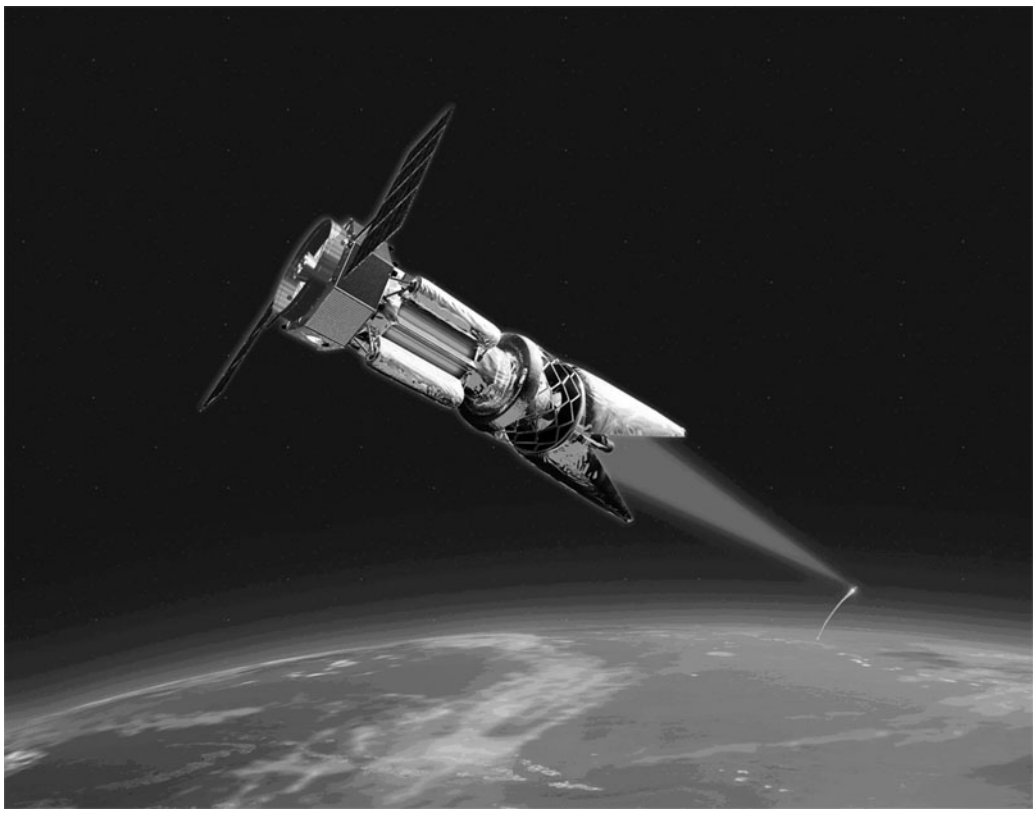
SPACE BASED LASER (SBL)



BMDO and Air Force Funded Experiment

Total Number of Systems:	1
Total Program Cost (TY$):	$3B
Average Unit Cost (TY$):	N/A
Full-rate production:	N/A

Prime Contractor

Joint Venture: Boeing, Lockheed Martin, and TRW

SYSTEM DESCRIPTION

The Space Based Laser (SBL) is a pre-Milestone 0 research effort for space-based directed energy systems. All efforts and objectives are to be compliant with the Anti-Ballistic Missile Treaty. The SBL's primary mission, if deployed, would be to negate ballistic missiles while they are in their boost phase, which has the advantage of eliminating decoys and may prevent the warhead(s) and/or submunitions from being deployed. The range of the SBL is expected to be thousands of kilometers. Eventually, a constellation of SBL satellites could be deployed providing worldwide coverage. The SBL could be a contributor to a layered, family of systems missile defense.

The laser will be an HF (hydrogen fluoride) chemical laser with multi-megawatt power. The HF laser operates at a wavelength of 2.8 micron. Besides the high-energy laser, the SBL will also have an Acquisition, Tracking, and Pointing (ATP) system to locate and track targets as well as provide information needed to aim the high-energy laser. The SBL will have a beam controller, which will be

responsible for pointing the laser (based on data from the ATP system) and for beam quality. The beam director will focus the outgoing high-energy laser on the target.

BACKGROUND INFORMATION

The SBL follows at least a quarter century of research into high-energy laser weapon systems, including a great deal of work done during the 1980s under the Strategic Defense Initiative (SDI). Chemical laser weapons were first demonstrated in the mid-70s (dating back to the Mid-Infrared, Advanced Chemical Laser, also known as MIRACL). More recently, the Alpha program has demonstrated megawatt HF lasers suitable for space deployment. Concurrent progress has also been made with key optics technologies, such as large segmented mirrors developed under the Large Advanced Mirror Program and uncooled optics capable of handling high-energy laser beams.

The SBL Integrated Flight Experiment (IFX) contract was awarded to the Joint Venture team of Boeing, Lockheed Martin, and TRW in February 1999. This contract will include technology maturation, IFX design and development, construction of ground test facilities and the execution of ground tests, and launch and on-orbit testing. The program tentatively plans to launch the IFX space vehicle in FY12 with a three-year mission. Leading up to IFX launch will be a series of integration tests performed on the ground. The culminating event of the SBL IFX is to conduct a lethal demonstration, using a laser in space to destroy a thrusting target.

The Ballistic Missile Defense Organization and the Air Force jointly fund the SBL IFX, with the former paying about 55 percent of the program cost and the Air Force executing the program. Total program cost is expected to be around $3 billion. The current 18-month phase of the program is funded for approximately $125 million. Between now and FY12, technology maturation will continue and design of the laser, beam control, beam director, and spacecraft systems will begin.

Design and construction of the SBL Test Facility (STF) is expected to begin in 2002. The STF will be a large facility that will enclose an entire SBL vehicle and allow testing of the entire system—including the high-energy laser—in an evacuated space environment. The STF is expected to be completed in approximately 2007; at this point, a four-year test period in the STF would begin, leading up to the IFX launch from Cape Canaveral in 2012.

At this time, there are no plans to initiate a formal acquisition program to develop an operational, combat-ready space-based laser weapon system. The SBL IFX is an experimental program. The SBL IFX vehicle will not be a prototype, but it will be used to learn about the engineering challenges and feasibility of developing a space-based weapon system and its potential benefit to missile defense.

TEST & EVALUATION ACTIVITY

At this early stage in the program, test and evaluation performed under the SBL program has generally been limited to component and sub-system level developmental testing. Besides testing required to develop the actual SBL system, lethality tests have also been conducted. This testing has generally been limited to coupon-level tests, but because the SBL and ABL are laser weapons that negate missiles during the boost phase, the SBL program plans to team with the ABL program to jointly conduct lethality tests in the future. Although testing conducted under the SBL program so far has been developmental in nature, there is a legacy of testing—including both high-energy laser and optics as well

as lethality testing—that has been conducted on various programs, including SDI programs and follow-on program such as Alpha.

The STF is currently in the planning stage. Three sites are currently under consideration for hosting this facility: Stennis Space Center (MS), Redstone Center (AL), and Kennedy Space Center (FL). A decision to build the STF at one of these sites is expected in early FY01. Groundbreaking will occur in 2002, and the facility should be completed in 2006. Integration of the laser, beam control, beam director, and spacecraft systems in the STF would then begin, leading up to integrated tests in 2008 or 2009. A period of time is provided in the schedule to incorporate the lessons learned from these tests into the final IFX design, which would be tested in the STF starting in approximately 2010, prior to launch in 2012.

TEST & EVALUATION ASSESSMENT

The STF will be a very large facility, and will support a major test and evaluation undertaking for the SBL. The STF will simulate the space environment with a large, integrated satellite actually operating—including the production of a high-energy laser beam and exhaust gases. The program should be commended for planning such a facility early in the overall Integrated Flight Experiment.