

SBIR Topic Number:

AF95-245

Title:

Optical Coupler Between IR Scene Emitter & Installed Sensor

Contract Number:

F04611-96-C-0071

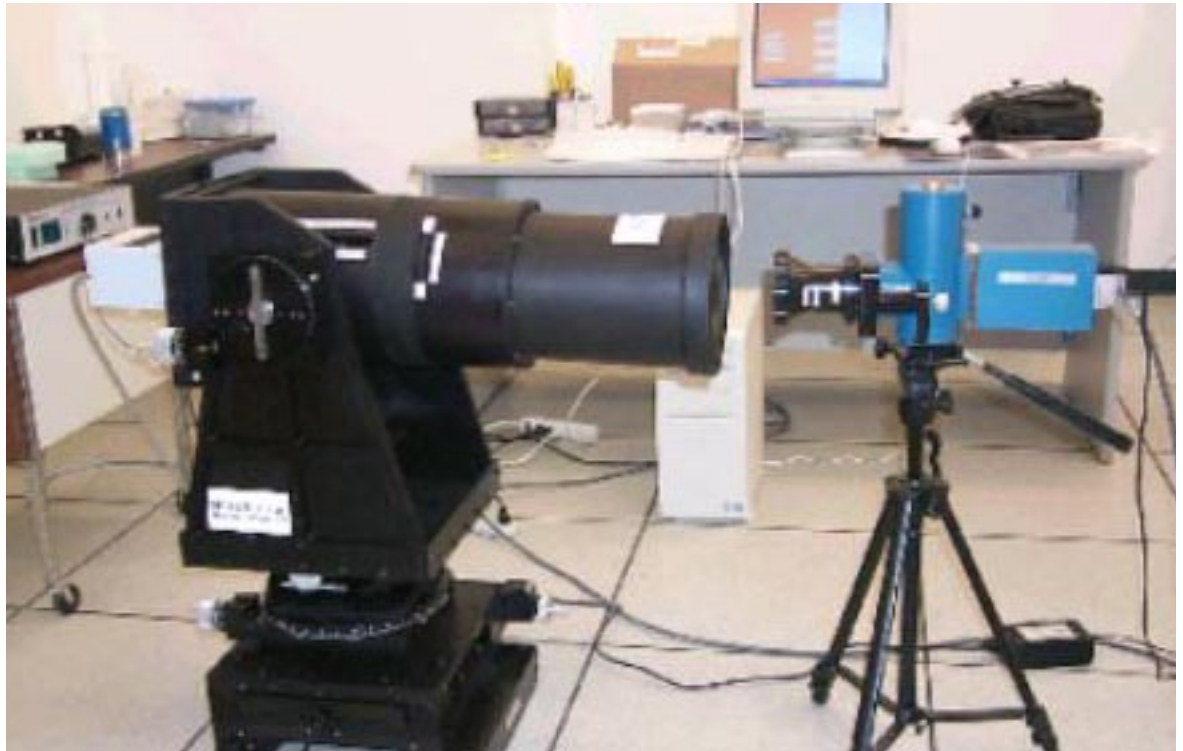
SBIR Company:

OPTICS1 Inc.,
Westlake Village, CA

Technical Project Office:

AFFTC/412TW/EW-MA,
Edwards AFB, CA

An example of Air Force supported SBIR technology that has been transitioned into an Air Force or other DoD system or subsystem or used by Air Force test ranges and facilities or maintenance depots.



MWIR Collimator between IR projector device to the left and MWIR camera to the right.

SBIR Project Aids Development of New Optical Technology for Testing On-board IR Sensors

- Real-time, large format IR scene generators and projectors require high fidelity and versatile optical coupling to serve modern military aircraft.
- The resultant optical collimators are being used on a number of DoD programs. The Air Force has proposed this SBIR supported system to support the Airborne Laser (ABL) program.

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Air Force Requirements

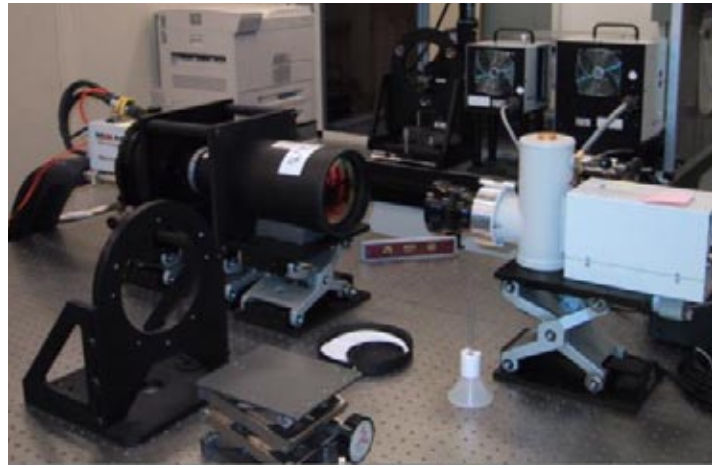
The test and evaluation of installed IR sensors on-board modern military aircraft presents new challenges for the ground test environment. Current development of real-time, large format, IR scene generators and free space projectors require optically coupling between the projector and the installed sensor to simulate an IR scene which is observed by the sensor with sufficient fidelity such that the sensor behaves as if it were observing the outside world during a flight.

SBIR Technology

This SBIR effort addressed the critical shortfall in test capability by analysis, design, and manufacture of various IR optical collimators to provide compact, high fidelity, low profile, and versatile, interfaces between an IR two-dimensional, free space IR emitter and the sensor unit under test. Both mid-wave and long-wave infrared sensors need to be tested. Both fixed focal length and variable focal length optical collimators were to be considered. Additional small, medium, and large fields-of-view were design parameters. Ease of use and low weight were additional design considerations.

Air Force Transition Payoff

The resultant optical collimators have been used to provide a proof-of-concept demonstration with an IR Maverick missile and have been used by the Navy to test Forward Looking Infrared sensors. The Air Force has proposed the IR projector system using the collimator to support the ABL program. The future use of this test capability will enable pre-mission/pre-flight as well as post-flight check out of installed IR sensors to reduce flight hours needed to debug systems, to provide a secure test facility, and to provide a controlled, repeated test environment for post-flight debugging. This will result in more capable IR sensors at a reduced cost from a T&E approach.



Company Impact

The SBIR project presented a unique set of challenges to assure the level of performance needed by the Air Force. While OPTICS 1 had prior experience in zoom lenses, this program added significantly to the company's specific understanding of thermal infrared zoom optics. This knowledge and experience contributed to OPTICS 1 winning of a subsequent Air Force development contract for a wide-angle infrared collimator.

Optical test equipment must typically perform 2 to 4 times better than the system under test. This makes the design and implementation of a collimator of this kind especially challenging. The resulting test equipment and associated software provided OPTICS 1 added capability that has benefited a number of other company state-of-the-art electro-optical programs. The work performed for the Air Force Flight Test Center (AFFTC), Edwards AFB was later leveraged in the development of a multi-spectral imaging system currently being delivered under a Phase III SBIR contract with another DoD component.

The opportunity to design and implement a state-of-the-art test system significantly advanced the company's capabilities and design methodologies. This knowledge is used on a continuous basis in other SBIR projects, in non-SBIR government work and in commercial and industrial systems.



U.S. AIR FORCE

SBIR/STTR

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