

Optical Transducer Assembly

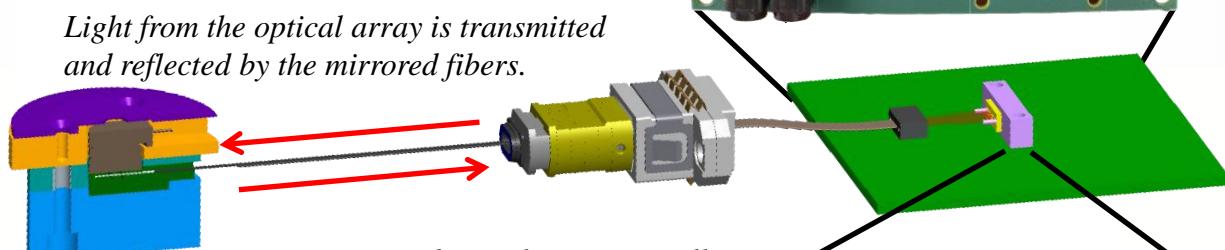
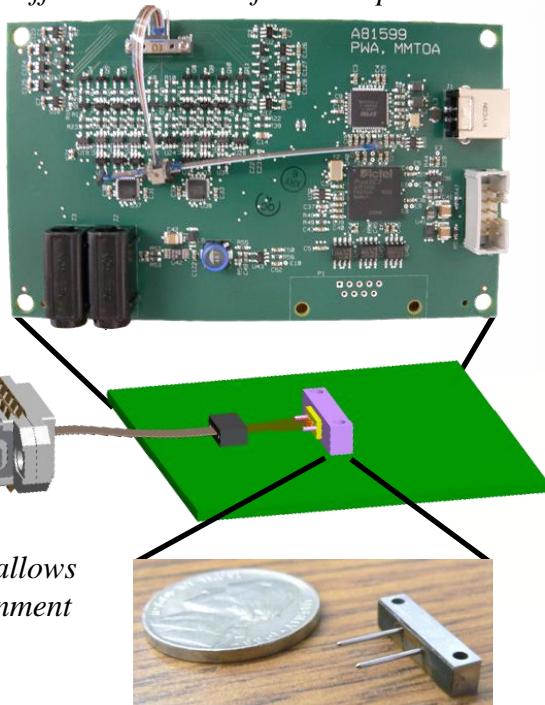
A critical aspect of Sandia's stockpile stewardship is to gather and analyze weapon flight test data. The primary responsibility of 8135 is to develop instrumentation to support DOD and DOE Joint Test Assembly (JTA) flight tests. Weapons from the stockpile are retrofitted with Telemetry Systems that measure signals from various components. The signals are formatted and transmitted, in real time, to a ground station for processing and evaluation. The data collected is required to assess the quality and reliability of the stockpile.

Detonation timing is critical for ensuring optimal performance of the weapon systems, and it is one of the important pieces of data the transmitter sends to the ground station for evaluation. To guarantee accurate timing of detonation, the new Optical Transducer Assembly (OTA) has been designed to detect the occurrence of the detonation with nanosecond resolution using a mechanical method described below. This reliable, accurate, and modular sensor unit is compatible with detonators across all systems, thus drastically reducing production and maintenance costs. The newly designed OTA is currently at TRL 4, and is being employed in the B61-LEP.

Special Features

- High noise immunity
- Self-check capability during assembly and operation
- Twelve optical channels can be used to acquire redundant data points or additional optical measurements of the surrounding environment.
- Could be modified to detect the shape and velocity of shock wave

Circuit board contains standalone FPGA, and various connectors that support different methods of data output.



The occurrence of detonation is indicated by the breakage of the fibers.

Mechanical connector allows easy assembly and alignment of optical fibers.

Plug-and-Play optical array contains twelve laser and photo-diodes.



Optical Transducer Assembly

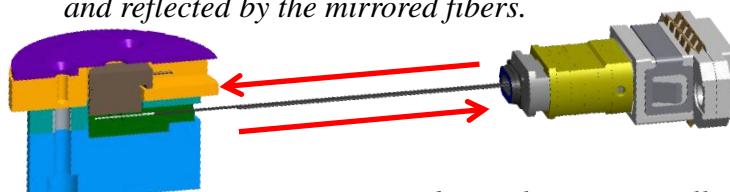
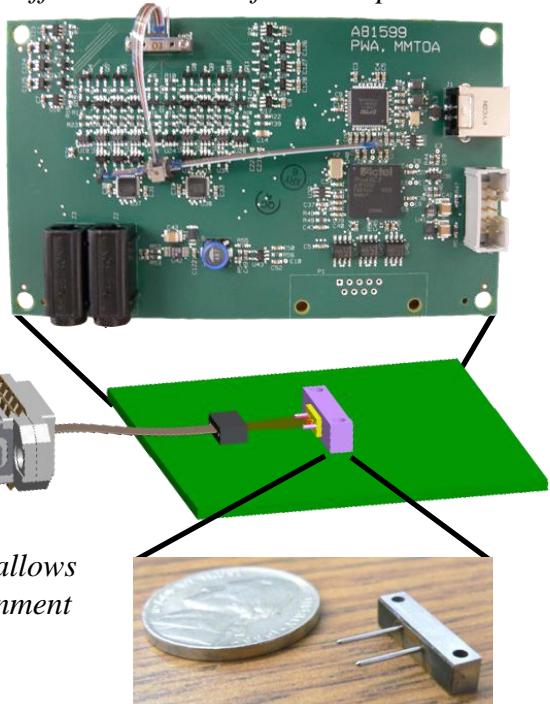
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Light from the optical array is transmitted and reflected by the mirrored fibers.

Mechanical connector allows easy assembly and alignment of optical fibers.



Plug-and-Play optical array contains twelve laser and photo-diodes.

The occurrence of detonation is indicated by the breakage of the fibers.