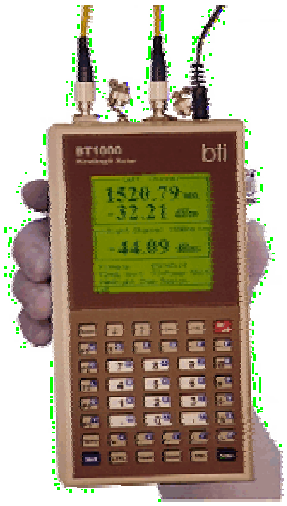
A Novel Fiber Optic System for Measuring the Dynamic Structural Behavior of Parachutes

For optimal design of parachutes, the ability to predict the opening forces during an airdrop is crucial. Solving this challenging technical problem will permit better design for both military and civilian parachutes in terms of structural parameters and selection of materials. As a cost-effective solution to the current practice of over designing parachutes, a novel methodology for real-time characterization of the structural behavior of parachutes during inflation is proposed. This method is based on using embedded fiber optic sensors for local stress/strain measurements. Two types of fiber optic sensors are used to sense static as well as dynamic loads in parachute canopy and suspension lines. An optical fiber Bragg grating (FBG) type sensor is used as a short strain gauge for measuring axial strain. The second type of fiber optic sensors is based on the Modal Power Distribution (MPD) technique, and is used for measuring axial as well as transverse strains. The integration of these two types forms a novel sensory system capable of measuring the dynamic structural behavior of a parachute during inflation.



At Ground Station

Signal Process Input

Sensor Signal output