

Advanced LED Navigation Lights for F15 Fighter

Case Study

Background:

- L-3 required rugged electrical sub-system for onboard F-15 positioning lighting

Challenge:

- Harsh operating environments
- Compatibility with existing circuitry
- Communications Interfaces
- No physical enclosure modifications

Solution:

- Combined controller and rheostat circuitry into single board
- Modeling and testing for MTBF, Heat Dissipation and EMI



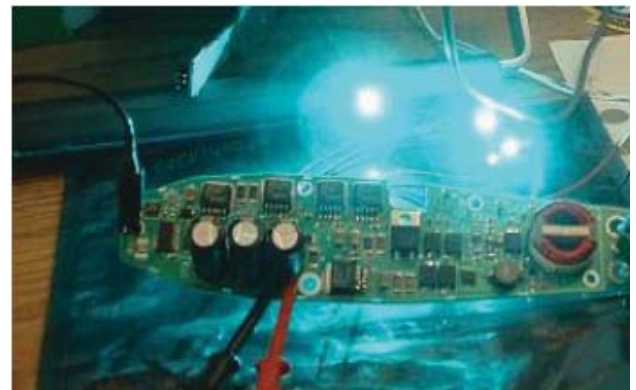
communications

Background:

An improvement program from Air Force Battle Labs was proposed to investigate new in-flight position lighting while the aircraft are in "stealth" mode. The benefit was to provide information to pilots about the position of others in their formation while maintaining complete visual black out on the ground and in the air. TSE was asked to participate on the proof of concept and prototype team as electronics design experts. TSE partnered with the prime contractor, Link/L-3, and another subcontractor, Breault Research (BRO), with expertise in optics and mechanical design.

Challenge:

Given the harsh operating environment of the system (extreme temperature variations, extreme vibrations, high-G forces and fast acceleration/deceleration), this was a very complicated design from the control electronics perspective.



The system required compatibility with existing incandescent lamp circuitry, and was also required to be incorporated into the aircraft without the need for modifications that would require recertification... a very lengthy and costly process in the aerospace industry.

Solution:

TSE worked closely with BRO to package the new solution into the required form factor for the aircraft. As a first challenge, TSE completed a new electronics printed circuit board design to incorporate an embedded controller that enabled legacy rheostats to control digital modulation and intensity.

The system required unprecedented levels of reliability in some very extreme environmental conditions. TSE provided all models for MTBF, Heat Dissipation and EMI mitigation, implementing all tests in the actual physical hardware. TSE then verified the design through environmental testing and emitted radiation measurements.

The new design was successfully flight tested by the Air Force for six months without failure, far exceeding the initial design requirements.