# Large Deployable Reflector Thermal Characteristics

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The thermal support group, which is part of the lightweight composite reflector panel program, has developed thermal test and analysis evaluation tools necessary to support the integrated interdisciplinary analysis (IIDA) capability. A detailed thermal math model of a panel and a simplified spacecraft thermal math model have been written. These models determine the orbital temperature level and variation, and the thermally induced gradients through and across a panel, for inclusion in the IIDA. To support test verification, the detailed panel math model utilized test boundary conditions. FIGURE 1 shows the schematic of how the panel model interfaces with the space environment to develop the orbital temperature response, and the test environment to develop test temperature data for analytical verification.

A detailed thermal model of a panel, utilizing a thermal analyzer (SINDA) was developed for the integrated interdisciplinary analysis effort. This panel model was integrated with a structural analysis tool (NASTRAN), a materials model, an optical model, and a test/analysis correlation tool. This interdisciplinary tool will allow the development of facesheet lay-ups and core material design for specific optical properties.

To determine the environmental and spacecraft boundary conditions imposed on a panel, a simplified system spacecraft configuration was developed, into which the detailed panel model was input. The SINDA thermal analyzer tool, along with the TRASYS geometric view factor and orbital environment tool, were used. This model allows the determination of panel temperature response expected for the LDR when subjected to the baseline orbital conditions.

The detailed panel thermal math model was also integrated into a thermal test evaluation tool by developing a thermal model that, instead of using a spacecraft interface, used test boundary conditions. This model was also incorporated into the IIDA tool, so that test data could be correlated with the predicted panel performance.

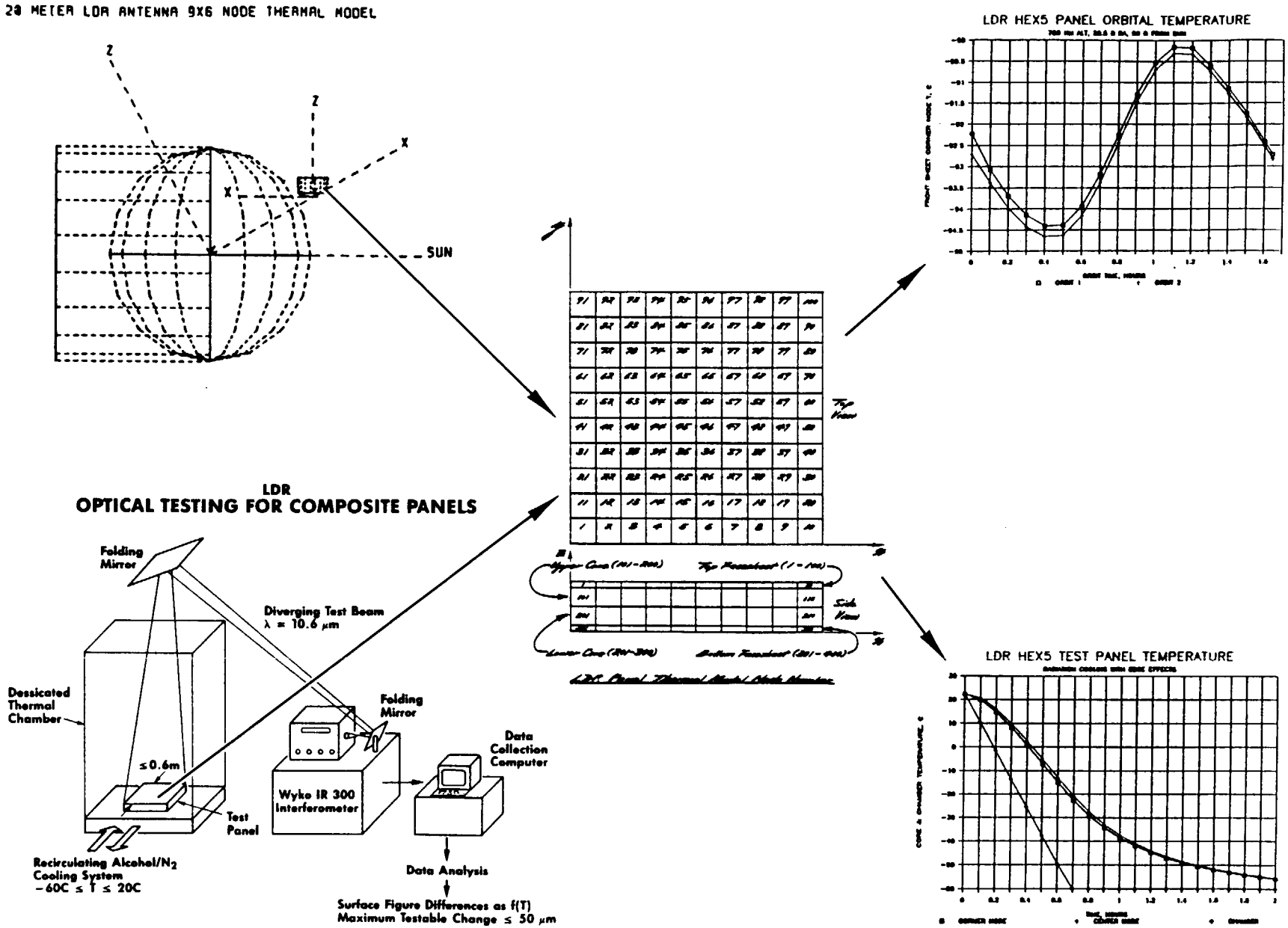


FIGURE 1. Composite Panel Development -- Thermal