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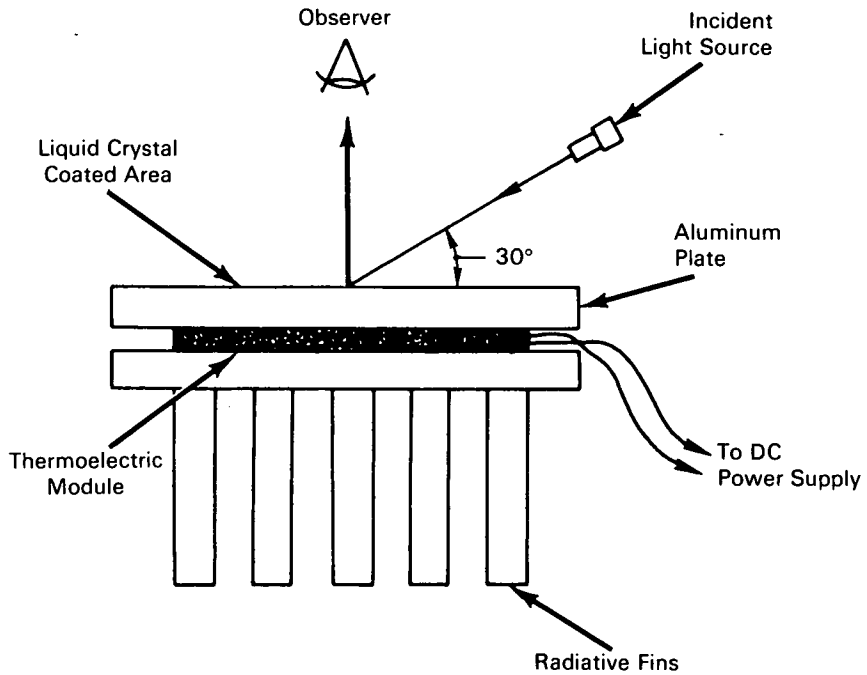
Brief 68-10221

NASA TECH BRIEF

Liquid Crystal Calibrator



An apparatus has been devised to determine the operating temperature range (sensitivity) of liquid crystals obtained from commercial sources. Liquid crystals (optically birefringent liquids) have been experimentally used for contact thermographic analyses of electronic components and adhesively bonded aircraft structural materials for several years. A procedure for using liquid crystals to detect voids in fiberglass laminates is summarized in Tech Brief 67-10286.

The calibration apparatus is designed to maintain a precisely controlled test surface temperature. It permits a measurement accuracy of ±0.5°F and a sensitivity of ±0.15°F. Absolute accuracy of the actual operating temperature of the liquid crystals and the calibrator is of secondary importance. Since the testing technique with liquid crystals involves the human eye as a detector, brilliance, a visually distinctive color range, and relative thermal sensitivity are factors of prime importance.

Heating or cooling the calibrator is achieved (over a range from 20° to 212°F) by controlling the amount and polarity of direct current applied to the thermoelectric module (obtained from a commercial source). To perform a calibration, a 2-inch-square area on an aluminum plate is first coated with the appropriate solvent-resistant black paint. One or two drops of the liquid crystal sample is then applied with a syringe to the dry painted surface. The volatile solvent is driven off from the liquid crystal by warming the surface to approximately 100°F prior to testing. The dc power

(continued overleaf)

supply to the thermoelectric module is adjusted, and the surface temperature and color of the liquid crystal area are recorded when steady state temperature conditions are established at any desired color. The angles of viewing and incident illumination must be kept constant at 90 degrees and 30 degrees respectively, in the same plane, during observations.

Note:

Complete details may be obtained from:

Technology Utilization Officer
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Patent status:

No patent action is contemplated by NASA.

Source: S. E. Cohen
of Lockheed-Georgia Company
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