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DESIGN CHALLENGES OF THE THEMATIC MAPPER

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The Thematic Mapper (TM), currently being developed by Hughes Aircraft Company under contract NAS 5-24200, is a multi-spectral earth resources sensor that will be launched on the National Aeronautics and Space Administration's Landsat-D satellite in 1981. The TM will operate in a circular, near-polar orbit at 705 km altitude and will scan a swath of earth 185 km wide. It will generate data at 84.9 Mbps over seven spectral ranges simultaneously and provide classification of crop fields as small as 6 to 10 acres.

One TM component is a moving scan mirror that is active during both the forward and reverse scans. One of the optical performance requirements of the mirror is linearity of motion (angle versus time). The final design of this component incorporates a mirror which has the required linearity and is not influenced by structural vibration. Another TM component that presented a design challenge was the optical metering structure (OMS), which had to be thermally stable across the temperature range encountered in the instrument's orbital environment and duty cycle. The OMS was made thermally stable by the use of graphite-epoxy structural elements. A third TM component is the focal plane assembly and its detectors. Overall size of the assembly and detectors was a major design consideration. The final configuration was achieved by the application of state of the art fabrication methods and circuit design techniques.

The end product of the Thematic Mapper is its output data. The need to process and handle this data at its 84.9 Mbps output rate, coupled with the requirement to monitor and evaluate the TM itself, led to a philosophy of computer utilization. The matching of the TM instrument with the capabilities of computer technology has proved to be the optimum method of realizing the instrument's capabilities.

L. E. BLANCHARD

Mr. Blanchard has 20 years' experience in the development of electro-optical systems. He is currently Associate Program Manager for the Thematic Mapper program being conducted at Hughes Aircraft Company under contract NAS 5-24200. From 1968 to 1977 Mr. Blanchard was Military Systems Department Manager at Hughes. Earlier, from 1961 to 1968 he was Section Head responsible for systems analysis on the Surveyor Spacecraft Television System program. BSEE, University of Miami (Florida), 1959; MSEE, University of Southern California, 1963.

OSCAR WEINSTEIN

A graduate of Newark College of Engineering, Mr. Weinstein has been intimately involved in the development of the Advanced Vidicon Camera System for Nimbus I and of the Return Beam Vidicon Cameras for Landsats 1, 2, and 3. In addition to his present position as Instrument Manager for the Landsat-D program, he is the Technical Manager for the Thematic Mapper instrument and support effort being conducted under contract NAS 5-24200 and has been directing this development for the past 7 years.