

# A NEW GaAs LASER RADAR FOR ATMOSPHERIC MEASUREMENTS

by

R. T. Brown, Sperry Research Center, Sudbury, Mass.

and

A. P. Stoliar, Sperry Gyroscope, Great Neck, New York

## ABSTRACT

A special GaAs lidar using fiber coupled diode lasers was constructed for the purpose of measuring the extinction coefficient distribution within a large atmospheric volume at a rate compatible with atmospheric kinematics. The technique is based on taking backscatter signature ratios over spatial increments after the returns are normalized by pulse integration. Essential aspects of the lidar design are beam pulse power, repetition rate, detection system dynamic range and decay linearity. It was necessary to preclude the possibility of eye hazard under any operating conditions, including directly viewing the emitting aperture at close distance with a night-adapted eye. The electronic signal processing and control circuits were built to allow versatile operations.

Extinction coefficient measurements were made in fog and clouds using a low-power laboratory version of the lidar, demonstrating feasibility. Data are presented showing range squared corrected backscatter profiles converted to extinction coefficient profiles, temporal signal fluctuations, and solar induced background noise. These results aided in the design of the lidar which is described. Functional tests of this lidar and the implications relevant to the design of a prototype model are discussed.

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