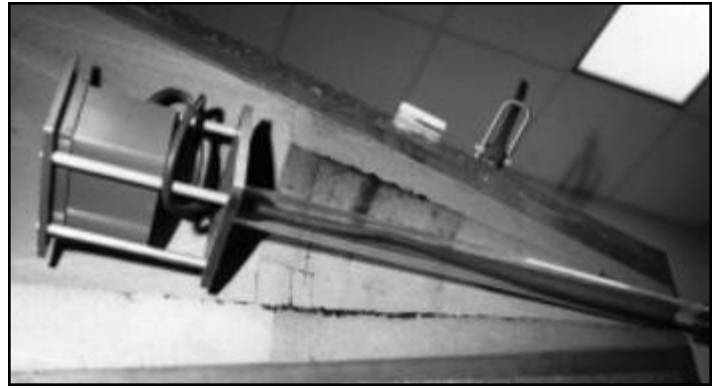


Millimeter-Wave Technology of Dielectric Resonator Antenna Systems

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ANTENNA—An open-ended waveguide antenna structure which serves as a radiation source for the anechoic chamber.



ANTENNAS—Dr. Stuart Long sits at his computer in the Cullen College of Engineering Building with the School of Architecture in the background. Based on the design of an 18th-century Georgian office building, the architecture building is crowned with a Greek temple. Dr. Long trains students to test antenna performance in the anechoic chamber.



(Above)—Chris DeYoung, electrical engineering senior (*r.*), and Ben Fasenfest (*l.*) adjust a metal plate designed for positioning antennas in the anechoic chamber for on-site testing. (Below)—DeYoung sits at the control panel and makes adjustments in frequency and sensitivity for testing antennas.

IN THE EARLY 1980S, PROF. STUART LONG DEVELOPED THE DIELECTRIC resonator antenna (DRA). The DRA is a chip of ceramic-type material shaped in a designed manner—rectangular, hemispherical, or cylindrical—mounted on a ground plane, and fed by a probe, microstrip line, or a slot in the ground plane. At certain frequencies, these DRAs can be made to resonate. The physical dimensions and the composition of the material determine the frequency at which these devices resonate. Current research has focused upon efforts to increase bandwidth. Thus, researchers find themselves moving higher into the electromagnetic spectrum and into the millimeter wave region where frequencies range from 30 GHz to 100 GHz.

Research is continuing on the mutual coupling between two cylindrical probe-fed DRAs. Findings compare favorably with previously measured data gathered from a slot-coupled rectangular DRA. Coupling decreased as the distance increased, supporting data consistent with common theoretical data regarding mutual coupling.

