

**DESIGN OF CIRCULARLY POLARIZED, OMNIDIRECTIONAL MICROSTRIP  
SOUNDING ROCKET ANTENNAS FOR TELEMETRY AND GPS  
APPLICATIONS**

By

Ty Sullins

**RECOMMENDED:**

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Advisory Committee Chair

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Department Head

**APPROVED:**

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Dean, College of Science, Engineering and Mathematics

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Dean of the Graduate School

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Date

**DESIGN OF CIRCULARLY POLARIZED, OMNIDIRECTIONAL MICROSTRIP  
SOUNDING ROCKET ANTENNAS FOR TELEMETRY AND GPS  
APPLICATIONS**

A  
THESIS

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By  
Ty Sullins, B.S.

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## **Abstract**

The orientation of a sounding rocket with respect to ground stations or GPS satellites is often highly variable and sometimes unpredictable due to its trajectory and spin. Therefore, a sounding rocket antenna should have a radiation pattern that is nearly omnidirectional to ensure sufficient signal strength in any direction, and the antennas should be circularly polarized to minimize polarization loss. Microstrip antennas are well suited to meet these requirements because they are low profile, lightweight, durable, and can be conformed to nonplanar geometries. Additionally, circularly polarization can be achieved using simple geometries and small size. This dissertation presents the theory and equations required to design common microstrip antennas. Circularly polarized telemetry and GPS antennas are designed for sounding rocket payloads with 6, 8, and 14-inch diameters, and their performance is compared with linearly polarized antennas. A circularly polarized antenna for a 14-inch diameter rocket payload is fabricated and its measured performance compared with theoretical predictions.

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