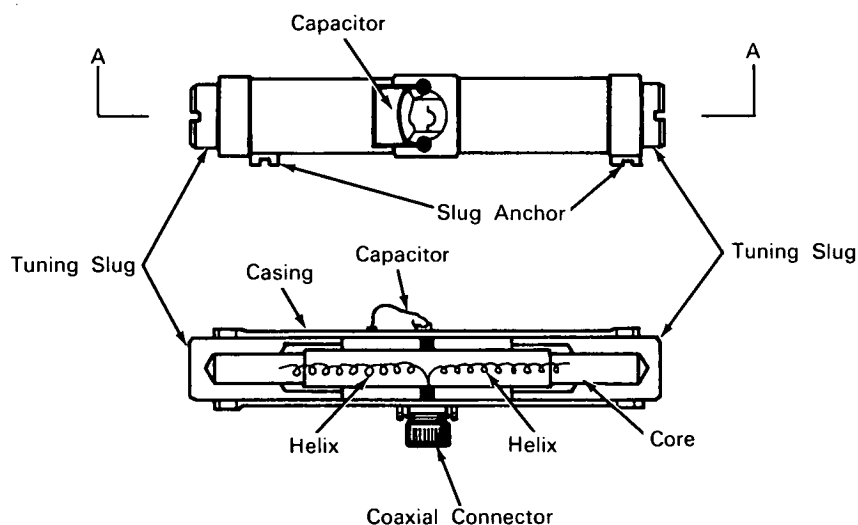


NASA TECH BRIEF



NASA Tech Briefs are issued by the Technology Utilization Division to summarize specific technical innovations derived from the space program. Copies are available to the public from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia, 22151.

Helical Coaxial-Resonator Makes Excellent RF Filter



The problem: In certain applications, one antenna serves a dual function as both receiving and transmitting antenna. Where the transmit and receive frequencies are closely spaced, isolation of each from the other becomes an acute problem if the transmitter power is above a certain level. Conventional filtering of the receiver input line results in an intolerable insertion loss.

The solution: A helical-wound coaxial center conductor inside a metal tubing outer conductor exhibits a high value of characteristic impedance at high magnification factor. Attenuation of 25 to 27 db at the transmitter frequency has been obtained with practically zero db insertion loss at the receiver frequency where the receiver frequency is within $\pm 8.5\%$ of the transmitter frequency.

How it's done: An outer conductor is formed by the casing, turned from 5/8-inch aluminum bar stock

3-1/2-inches long. An inner conductor form is fabricated from 1/2-inch plastic rod stock grooved for winding two helices, which begin at the center and wind each way to the open circuit ends. The inner conductor (core) form is supported at each end by a tuning slug also turned from plastic rod stock and threaded internally to screw snugly on the end of the form. This achieves a continuous fine-tuning adjustment as it varies the amount of dielectric surrounding the open end of the inner conductor. The outer surface of the tuning slug fits snugly against the inner wall of the outer conductor. When fine tuning has been accomplished, a small screw is tightly self-tapped into each slug and on through into the inner conductor form. This effectively anchors the tuning slugs to prevent slipping and resultant detuning by environmental vibration. The center portion of the form is supported by flowing a resilient plastic around the center area, filling it completely to the inner wall of the casing and

(continued overleaf)

extending 1/16-inch either side of the center conductor lead where it extends outward to the coaxial connector.

Note: Inquiries concerning this invention may be directed to:

Technology Utilization Officer
Goddard Space Flight Center
Greenbelt, Maryland, 20771
Reference: B65-10012

Patent status: NASA encourages the immediate commercial use of this invention. Inquiries about obtaining rights for its commercial use may be made to NASA, Code AGP, Washington, D.C., 20546.

Source: Radio Corporation of America under contract to Goddard Space Flight Center (GSFC-243)