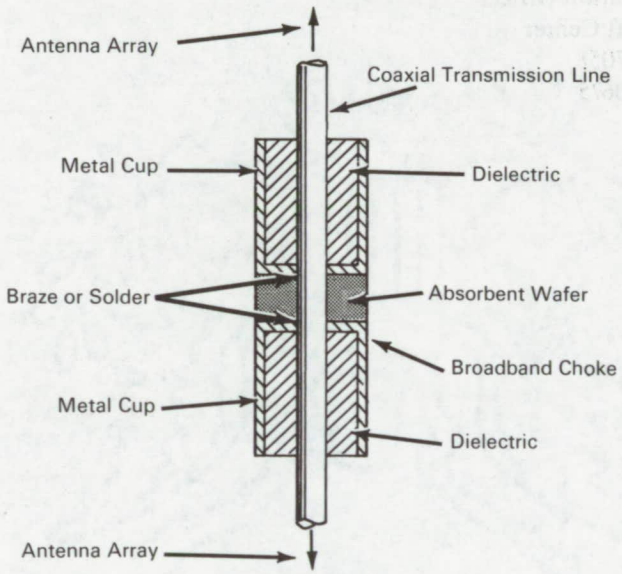
NASA TECH BRIEF

Broadband Choke Suppresses Spurious Currents in Antenna Structure



The problem:

To devise a means of preventing induced (spurious) currents in an antenna support structure from adversely affecting the radiation pattern of the antenna over a broad band of radiation frequencies. Conventional quarter-wavelength shorted chokes which have been used to present discrete open circuits to such currents are effective over only a narrow frequency band around the center frequency. Additionally, because chokes of this type must be restricted in diameter (to prevent shielding of the radiation pattern), their usable frequency bandwidth is limited. Also, because of this size restriction, the diameter of the antenna support structure must be kept correspondingly small and therefore generally of decreased physical strength.

The solution:

In one particular antenna system, the support structure contains a coaxial line feed system which connects a pair of antenna arrays for radiating circularly polarized waves in a toroidal field pattern. For this system, a pair of quarter-wavelength chokes are mounted on the coaxial line. The chokes, consisting of metal cups filled with a dielectric material, are arranged so that their open ends face the antenna arrays and their shorted ends are connected by an absorbent wafer (an iron-loaded silicone rubber). The coaxial line, passing through holes cut in the cups, is brazed or soldered to the hole circumferences to form good electrical contact between the cups and the outer surface of the transmission line.

(continued overleaf)

At the center frequency of the system, the chokes present open circuits to the spurious currents. At frequencies off the center frequency, currents would flow past the choke joint if the absorbing wafer were not present. Further, the currents from each end would interact with opposite chokes and reduce the effectiveness of each choke. The absorbent attenuates the currents present on the support structure which are not suppressed by the quarter-wavelength choke arrangement. The choke-absorbent combination approximately doubled the usable frequency range for the particular antenna system studied.

Note:

Inquiries concerning this invention may be directed to:

Technology Utilization Officer
Manned Spacecraft Center
Houston, Texas 77058
Reference: B67-10675

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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