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Brief 69-10401

NASA TECH BRIEF

Improved Ferrous Shielding for Flat Cables

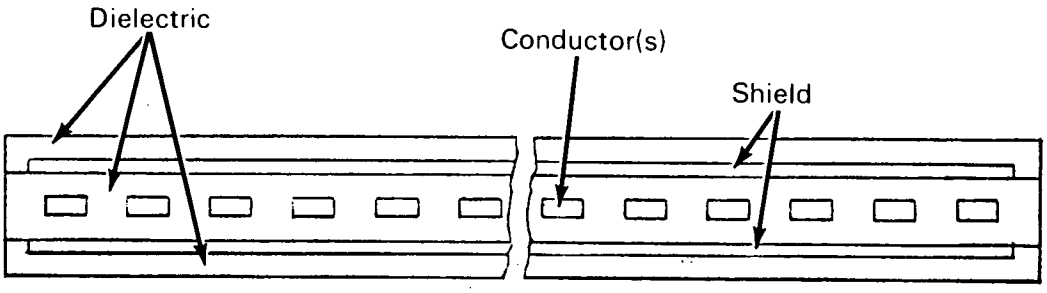

Figure 1. Present Configuration

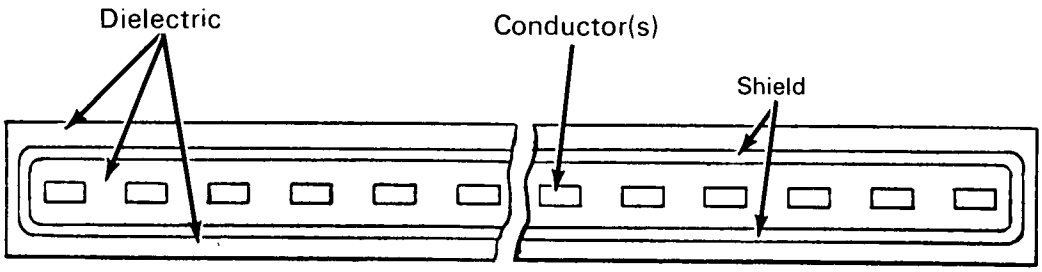

Figure 2. Proposed Configuration

The problem:

To improve the shielding of flat multicore cables. At present a typical cable (Figure 1) is a dielectric sandwich containing the cores shielded on one or both broad sides by a nonferrous plate; the narrow edges are not shielded. Such shielding is effective electrostatically, but not magnetically throughout the spectrums of power, audio, and video frequencies. Mere substitution of ferrous for nonferrous shielding does not improve its efficiency significantly because the lack of resistive and magnetic continuity at the edges prevents the flow of circumferential eddy currents and increases the magnetic-path reluctance.

The solution:

A thin, seamless, ferrous shield around all cores (Figure 2) optimizes low-frequency magnetic shielding. Covering of this shield with an ultrathin seamless coat of highly conductive nonferrous material optimizes the efficiency of high-frequency magnetic, electrostatic, and plane-wave shielding. Practical types and thicknesses of ferrous and nonferrous materials are complementary.

(continued overleaf)

How it's done:

Typically, a flat cable (figures 1 and 2) is shielded by a 500-microinch-thick layer of a representative 80% nickel-iron alloy having an initial permeability of about 20,000 and a saturation threshold of about 7,500 gauss; the layer is coated externally with a few microinches of copper. Such materials are essential for useful degrees of attenuation. Lower permeabilities require excessive thicknesses or numbers of layers, while higher permeabilities are excessively strain-sensitive and saturate readily.

For flat cables, application of the principles described and use of such materials enable the design of shields that provide useful degrees of isolation from magnetic, electrostatic, and plane-wave fields, and magnetic-saturation resistance, throughout the generally used magnetic spectrum. Such cables incorporate also inherent distributed low-pass filtering in the interconnection wiring.

Notes:

1. No further documentation is available. Inquiries may be directed to:

   Technology Utilization Officer
   Marshall Space Flight Center
   Huntsville, Alabama 35812
   Reference: B69-10401

Patent status:

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

Source: R. J. Drechsler of
Douglas Aircraft Company
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(MFS-14524)