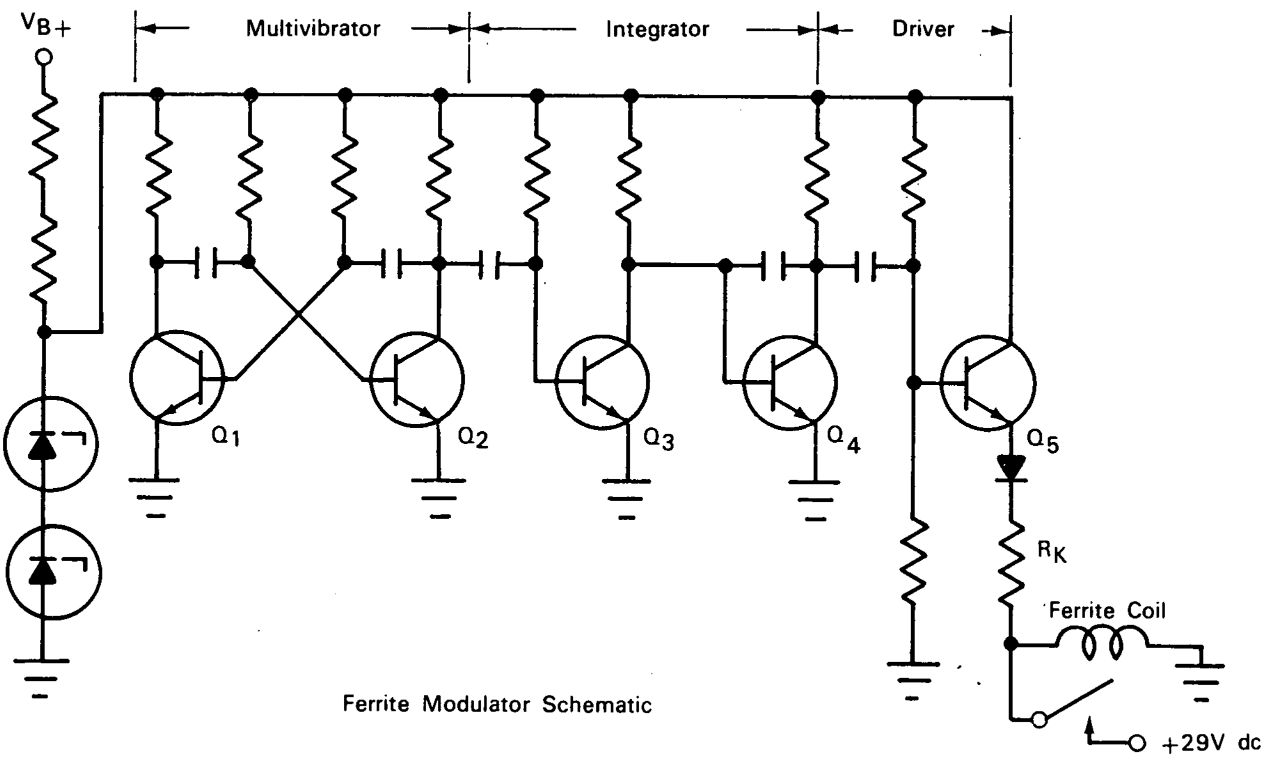
NASA TECH BRIEF

Ferrite Attenuator Modulation Improves Antenna Performance



Ferrite Modulator Schematic

The problem:

Multiple antenna systems onboard aircraft create undesirable interference zones under certain conditions—equal signal strength and a 180° phase displacement. The interference zones reduce the signal strength at the ground receiving station during critical flight periods; i.e., takeoff and landing.

The solution:

Reduce the gain of the antenna element causing the interference by inserting a ferrite attenuator into the appropriate waveguide. Modulating the ferrite attenuator to change the antenna gain at the receive frequency permits ground tracking until the antenna is no longer required, at which time the fixed attenuation quantity is inserted into the waveguide.

How it's done:

The modulator schematic shown in the figure is composed of three sections: (1) a multivibrator, (2) an integrator, and (3) a driver for the ferrite coil. The multivibrator is a free running circuit that establishes the frequency of the modulation wave. Q_3 is a switch in the Miller integrator and is controlled by the multivibrator output. The charging and discharging of the capacitor between the base and collector of Q_4 deter-

(continued overleaf)

mines the final output waveshape. The emitter follower, Q_5, drives the ferrite coil. A blocking diode added to the emitter circuit prevents feedback from the 29 V dc applied to the ferrite coil. R_K inserted in the emitter of Q_5 determines the amount of attenuation required.

Notes:

1. With minor modification, the modulation technique can be applied to navigation and communication systems employing phased-array antenna elements.
2. Requests for further information may be directed to:
   Technology Utilization Officer
   NASA Pasadena Office
   4800 Oak Grove Drive
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Patent status:

Inquires about obtaining rights for the commerical use of this invention may be made to:

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