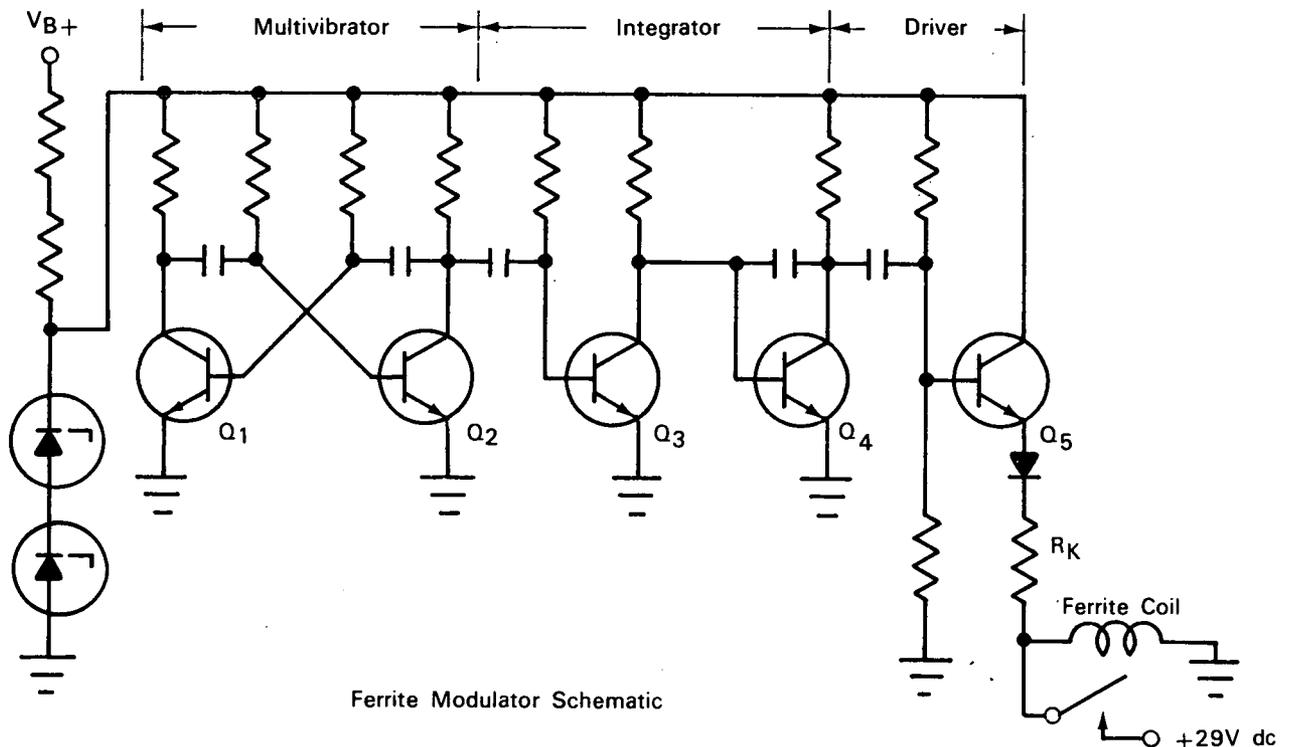


# NASA TECH BRIEF



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## 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 fre-

quency 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<sub>3</sub> 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<sub>4</sub> 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  
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**Patent status:**

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

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