

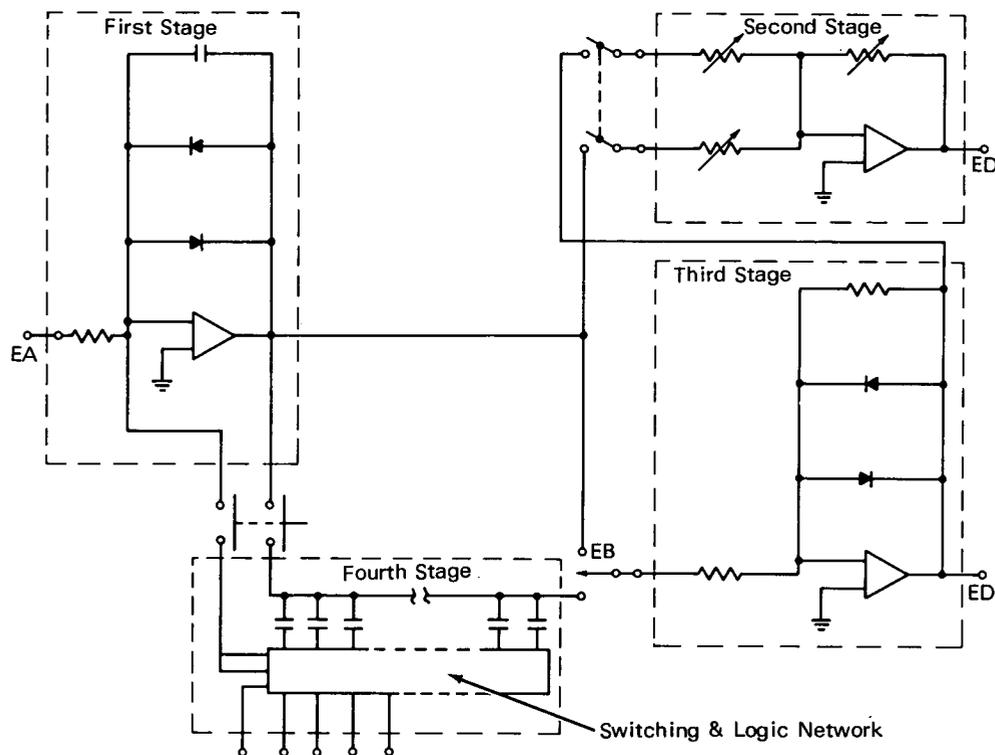
NASA TECH BRIEF

Marshall Space Flight Center



NASA Tech Briefs announce new technology derived from the U.S. space program. They are issued to encourage commercial application. Tech Briefs are available on a subscription basis from the National Technical Information Service, Springfield, Virginia 22151. Requests for individual copies or questions relating to the Tech Brief program may be directed to the Technology Utilization Office, NASA, Code KT, Washington, D.C. 20546.

Waveshaping Electronic Circuit



The problem:

Spurious sideband components generated in signal modulating systems cause interference to adjacent frequency channels. Premodulation pulse train filters which employ LC filters to suppress the unwanted sidebands are usually designed for symmetrical waveforms and specific bandwidths. The physical characteristics of the LC components limit the degree of application to integrated circuit fabrication techniques.

The solution:

A four-stage waveshaping circuit provides an output signal with a sinusoidal function in response to a bipolar transition of an input signal. The circuit shapes the instantaneous transition into a linear rate of change, and subsequently shapes the linear rate of change into a sinusoidal rate of change. Because the circuit contains only active components (inductive elements are eliminated), compatibility with integrated circuit techniques is assured.

(continued overleaf)

How it's done:

The first stage of the circuit is composed of an operational amplifier and feedback circuit, and produces an output signal with a linear rate of change in response to the instantaneous transition of the input signal. The second stage provides further waveshaping to the bipolar output signal from the first stage. When the first stage output signal undergoes a linear rate of transition from one output level to another level of opposite polarity, the second stage provides an opposite-phase bipolar signal with a transition having a sinusoidal rate of change. The exclusive connection of the first and second stages effectively reduces the bandwidth of the input signal pulses, and thereby of its accompanying spurious sideband components.

The third stage generates an output signal which has a sinusoidal rate of change and a predetermined harmonic content. The harmonic content may be preselected at anywhere from 0 to 100%.

The fourth stage is composed of feedback ca-

pacitors and a selective switching matrix. When coupled to the first input stage, the capacitor feedback shapes the output signal with a predetermined slope characteristic.

Note:

No further documentation is available. Specific questions, however, may be directed to:

Technology Utilization Officer
Code A&TS-TU
Marshall Space Flight Center
Huntsville, Alabama 35812
Reference: B71-10429

Patent status:

No patent action is contemplated by NASA.

Source: T.P. Harper of
IBM Corp.
under contract to
Marshall Space Flight Center
(MFS-14916)