NASA TECH BRIEF

Feedback Loop Compensates for Rectifier Nonlinearity
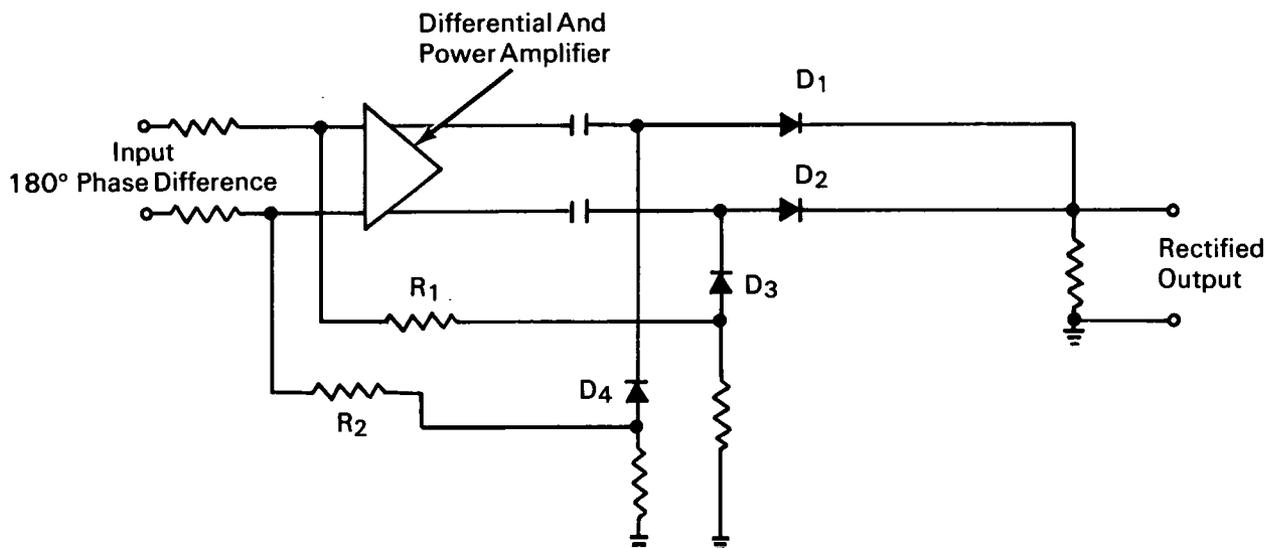
The problem:

To compensate for the nonlinear impedance of the rectifiers in a signal processing circuit. This circuit is required to rectify two sinusodial signals which are 180° out of phase and produce a single full-wave rectified output signal.

The solution:

Provide two negative feedback loops each of which incorporates a feedback rectifier to compensate for the nonlinearity of the signal processing circuit.

How it's done:

In the original circuit, the out-of-phase input signals are applied to a differential amplifier and a power amplifier. The amplified signals are rectified by D_1 and D_2 to produce a full-wave rectified output. [i] The negative feedback loops consist of D_3 and R_1

and D_4 and R_2, respectively, between the two input branches.

When the positive portion of one signal is being passed by one of the rectifiers (D_1 or D_2), the negative portion of the other signal is being passed by a compensating rectifier (D_3 or D_4) to the amplifier input. Thus as the positive signal feeds into one rectifier, the negative signal on the other line passes through the compensating rectifier and is fed back into the positive input of the amplifier. Initially, this signal is small so that the effective feedback voltage is correspondingly small, and essentially full gain of the input signal is achieved. When the input signal increases so that the rectifiers are operating in the linear region, the feedback signal increases so as to cut down the input signal.

(continued overleaf)

The characteristics of the paired rectifiers (D_1, D_3 and D_2, D_4) must be closely matched to provide for maximum linearity between the input and output signals.

Note:

Inquiries concerning this innovation may be directed to:

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