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Brief 71-10298

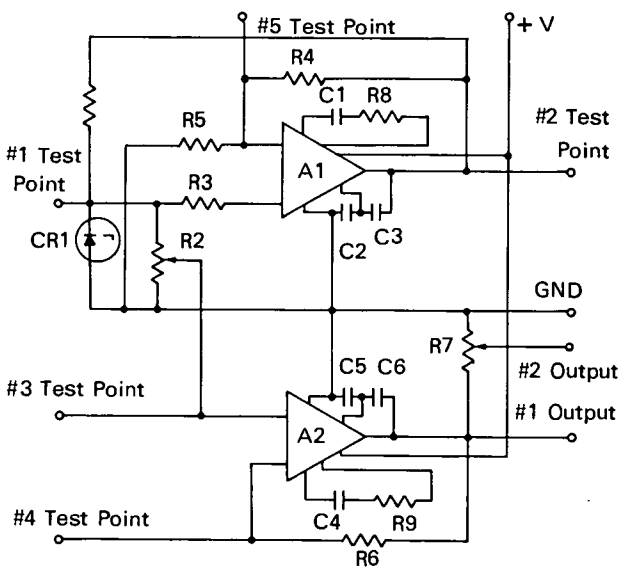
NASA TECH BRIEF

Marshall Space Flight Center

Precision Calibration and Reference Voltage Source For Data Acquisition Systems

The problem:

To design a precision calibration and reference voltage source for digital data systems. The source must dissipate a minimal amount of power (less than 10 mW) and must operate continuously for extended periods of time.



The solution:

Hybrid integrated circuit operational amplifiers which have inherent characteristics of low quiescent power dissipation and extended operational lifetime, with high reliability. The amplifiers are coupled to a zener reference diode in a current control and buffer configuration.

How it's done:

The hybrid circuit shown in the figure contains two monolithic operational amplifiers, A1 and A2, assembled on an alumina substrate. Positive feedback with a loop gain of less than one is incorporated around A1 to constant-current bias the low current zener diode CR1. This feedback effectively isolates the positive 12 Vdc supply and prevents input voltage fluctuations from affecting the current through CR1. Amplifier A2 buffers the output circuit, prevents loading of the zener, and provides current drive capability. The gain of A1 is adjusted to insure that the amplifier remains in its active region. Also, proper compensation is used to ensure that a 6 dB/octave rolloff is maintained through unity gain. Because amplifiers A1 and A2 input bias and zener bias currents are low, large value resistors can be used to reduce the quiescent power dissipation to a minimum. Output #1 is the reference voltage for data acquisition and output #2 provides the calibration signal.

The low-power precision calibration and reference voltage source operates with an error of less than 0.1%, dissipates approximately 10 mW and has excellent line regulation properties. The measured output noise was less than 1.5 mV RMS at 100 kHz. Loading effects are negligible, as evidenced by the capability of the output voltage to drive a 1 kΩ load with no nonlinearity errors.

Note:

Requests for further information may be directed to:

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Reference: B71-10298

(continued overleaf)

Patent status:

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

Patent Counsel
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George C. Marshall Space Flight Center
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Source: General Instrument Corp.
under contract to
Marshall Space Flight Center
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