Instrumentation amp has low offset, drift, and low-frequency noise

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Analog Devices' (www.analog.com) digitally gain-programmable AD8231 instrumentation amplifier exhibits zero offset. It has programmable voltage gains, which are successive powers of two, from $2^0=1$ to $2^7=128$ (**references** 1 and 2). The AD825x family also includes some digitally gain-programmable instrumentation amplifiers, which have gain expressed as powers of 10. These amplifiers contain no internal autozero circuitry, however. The composite instrumentation amplifier in **Figure 1** suits applications requiring instrumentation amplifiers having voltage gains of a multiple of 10 and requiring low voltage offset, drift, and low-frequency noise.

The design exploits the fact that the gain is 10^M, where M is an integer, which you can express as $10^M=2^M\times5^M$. The circuit in **Figure 1** employs a cascade of the autozeroed AD8231 instrumentation amp, IC_1, with a preset voltage gain of eight, IC_2, and IC_3. The net result is that the input-voltage offset of IC_2 causes an RTI (referred-to-input) voltage offset, which decreases by a factor of eight compared with an offset of a stand-alone circuit, IC_2. The same holds also for the offset-voltage drift. The auto-zeroing circuitry of the IC_1 decimates the low-frequency noise. **EDN**

REFERENCES

1. "Zero Drift, Digitally Programmable Instrumentation Amplifier, AD8231," Analog Devices Inc, 2007, www.analog.com/en/prod/0,2877,AD8231,00.html.
2. "10 MHz, 20V/s, G=1, 2, 5, 10 iCMOSR Programmable Gain Instrumentation Amplifier, AD8250," Analog Devices Inc, 2007, www.analog.com/en/prod/0,2877,AD8250,00.html.

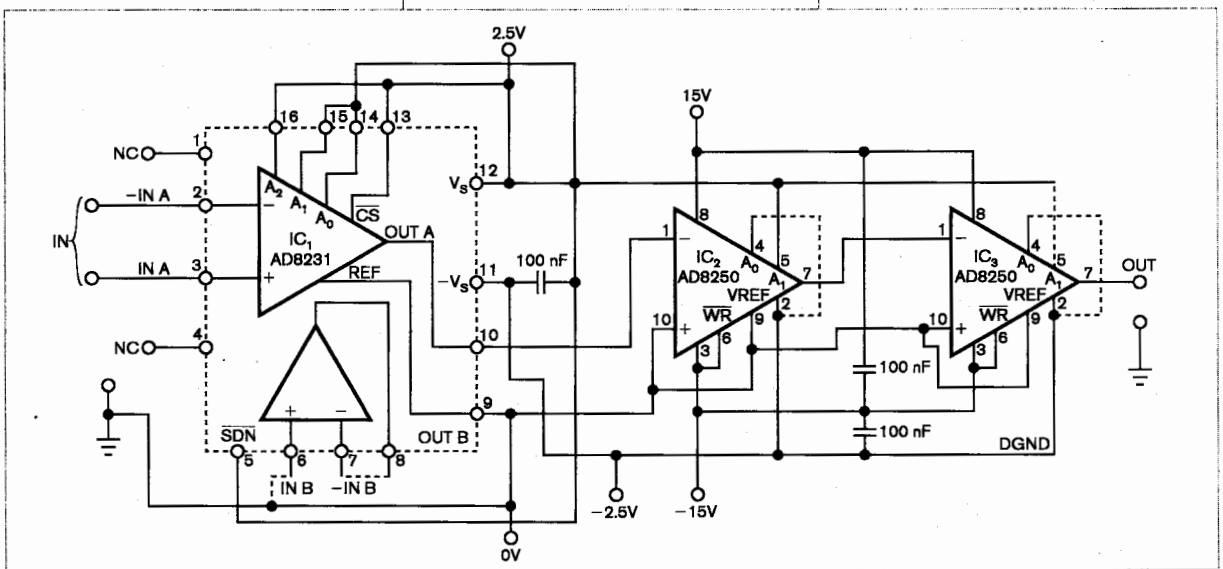

Figure 1 By cascading an autozeroed instrumentation amplifier having a gain of 2^3 and instrumentation amplifiers having gains of five, you get a decade-gain instrumentation amp whose dc performance is much better than that of monolithic decade-gain instrumentation amps.