A digital white-noise source

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In our search for an inexpensive and spectrally flat white-noise source, we came across a single-chip digital white-noise generator that is ideal for psychological researchers. The integrated circuit is fabricated in p-channel ion-implanted MOS technology and supplied in an eight-lead dual in-line plastic package. The device contains a 17-bit shift register and an internal clock. Pseudorandom noise is generated by an exclusive OR feedback from the 14th and 17th stages. An internal gate is included that prevents the device's entering a zero lock-up state, making this device superior to previous models.

This digital white-noise source can be operated from a single power supply within the range of -14 V to -28 V , which makes it readily adaptable to a behavioral laboratory using an existing power supply. The circuitry for this device is shown in Figure 1. The variable resistor is included to enable control of the output voltage. The output can be fed directly to the input of most commercial rise/fall gates or audio amplifiers. Figure 2 depicts the spectral characteristics of this device when connected as shown in Figure 1. The spectral characteristics were derived using a ubiquitous spectrum analyzer (Model UA 500A) by exponentially averaging 1,024 samples. It

Figure 1. Schematic diagram of a digital noise generator circuit.

can be seen that for frequencies from 1 Hz to 20 Hz, the output is $+5\text{ dB}$ (re. 20 Nm), and at 50 Hz, the output is only about 5 dB down.

It is suggested that the circuit be mounted on a perforated board using a dual in-line socket and wire wrapping the connections. The integrated circuit (SZ668) and potentiometer can be purchased for less than \$4 at any Radio Shack store.

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Figure 2. Spectral characteristics of the noise source shown in Figure 1.