

# A Low-Cost Audio Signal Generator: SimpleGen

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This circuit was originally designed for DeVry-Kansas City students around 1990. The idea is simple: Provide good quality audio and TTL/CMOS drive signals over the frequency range 1 Hz to 100 kHz while keeping the cost low. This circuit satisfies these needs and can be built for under \$30.00 (less if you scour your junk box!)

## *Circuit Description*

SimpleGen uses an Exar XR-2206 as its signal source. The XR-2206 is setup to provide sinusoidal output on pin 2 by resistor R4. (If you need the absolute lowest THD, replace R8 with a 500 Ohm pot and adjust it for minimum distortion using an audio spectrum analyzer).

The frequency of the XR-2206 is controlled by the R-C time constant from R5, R6, R7 and one of the timing capacitors, C2-C7.

TTL output is provided at pin 11 as an open-collector transistor. Resistors R9 and R10 transform the 12 V down to 4.8 V so that  $V_{OH}$  is correct for both CMOS and TTL. L1, the incandescent lamp, provides crude protection for the TTL output in case it is misconnected (such as to a power source).

Sine wave output comes from pin 2 on the XR-2206. This signal is clamped to  $V_{CC} / 2$ , so capacitor C8 is used to remove the DC level before amplification. R8 controls the amount of amplification by passing a specified amount of signal to the buffer amplifier, U2a.

The buffer amplifier provides a voltage gain of 2 v/v (+6 dB) and isolates the output of the instrument and provides increased current drive capabilities. R13 sets the output impedance of the generator to 50 Ohms.

## *Construction*

Good analog construction techniques must be used for this circuit. This includes using proper grounding and layout technique (use only one ground bus, and keep wiring short). C9, C10, C11 are filter and bypass capacitors and should be as close to their respective IC chip as possible to prevent unwanted oscillation and noise. Use chassis-mount BNC connectors for J1 and J2. Use a short length of shielded cable (RG-174 is a good choice) to connect J1 and J2 to the circuit board.

## *Conclusion*

Test equipment for electronics students need not be expensive! This circuit can meet the everyday needs of most experimenters for minimal cost.

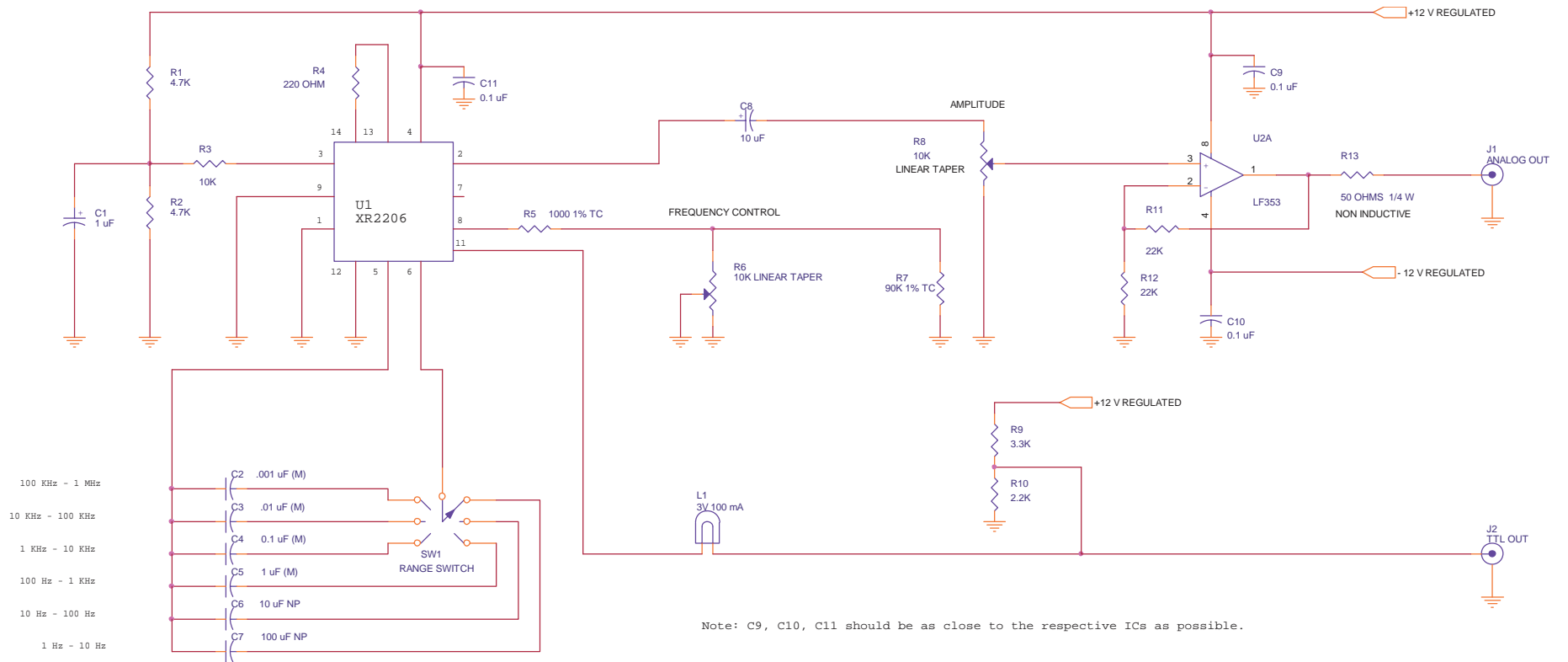


Figure 1: SimpleGen