

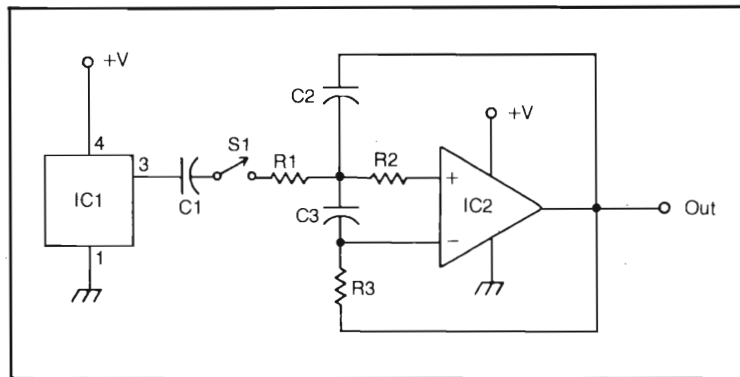


Fig. 3-70. Snare drum simulator.

Experiment with different values for C2. This electrolytic capacitor sets the decay time, or how long the cymbal will continue to ring after it is struck. For realistic sounding cymbals, this capacitor should have a value in the 50 μF to 100 μF range.

• **Snare Drum.** Figure 3-70 shows a circuit for synthesizing the sound of a snare drum. The parts list is given in Table 3-32.

Increasing the values of capacitors C2 and C3 will produce the sound of a larger drum. Reducing the values of these components will give the effect of a smaller drum.

• **SN76477/88 Sound Effects Synthesizer.** Many sound effects can be created with a relatively new IC device from Texas Instruments (and distributed by many dealers). This is the SN76477 Sound Effects Synthesizer chip. Its pin-out diagram is shown in Fig. 3-71.

A more advanced version of this device is the SN76488 which has an on-chip amplifier. The pin-out diagram for this IC is given in Fig. 3-72. Notice that the two chips are not pin to pin compatible, although they operate similarly.

Table 3-32. Parts List for the Snare Drum Simulator in Fig. 3-70.

R1	3.9 k Ω resistor
R2	1 k Ω resistor
R3	6.8 k Ω resistor
C1	0.047 μF capacitor
C2, C3	0.022 μF capacitor (see text)
S1	NO SPST push-button switch
IC1	Digital noise generator IC (MM5837)
IC2	op amp IC (741, or similar)

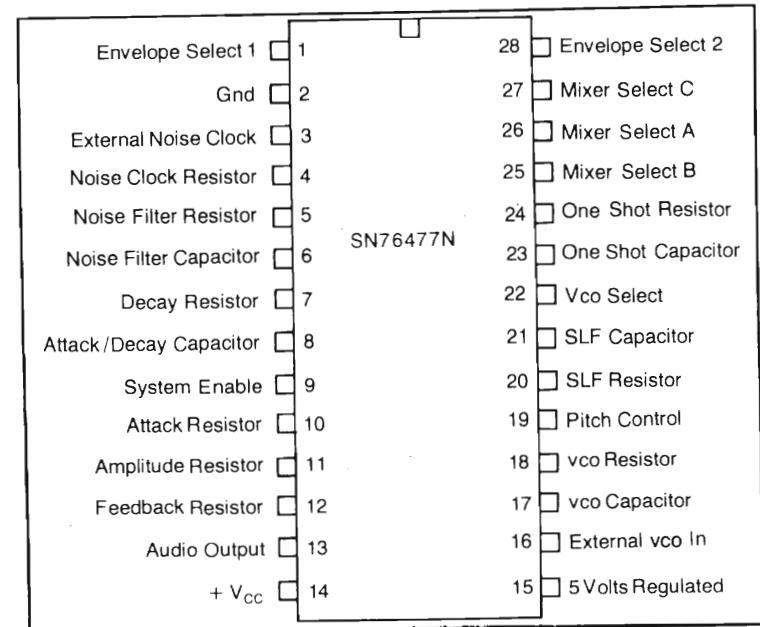


Fig. 3-71. SN76477 Sound Effects Generator.

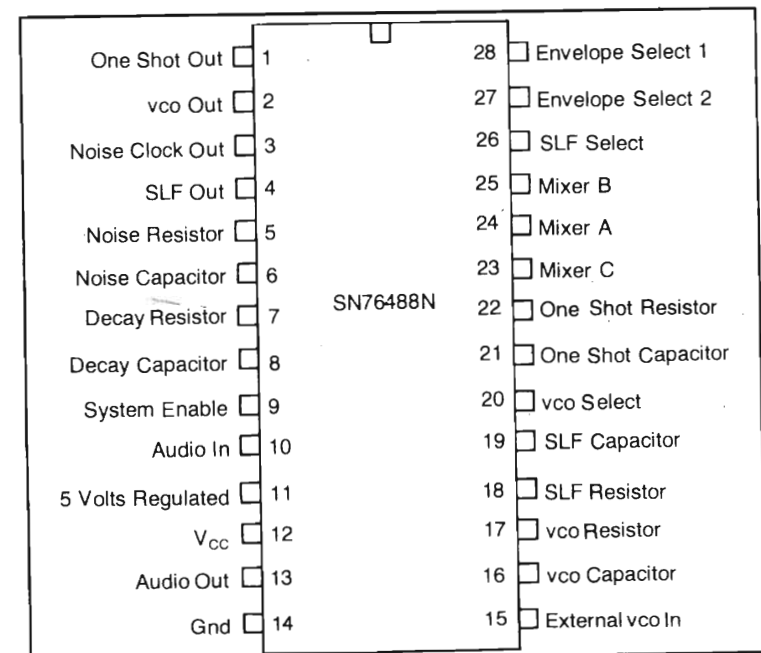


Fig. 3-72. SN76488 Sound Effects Generator.

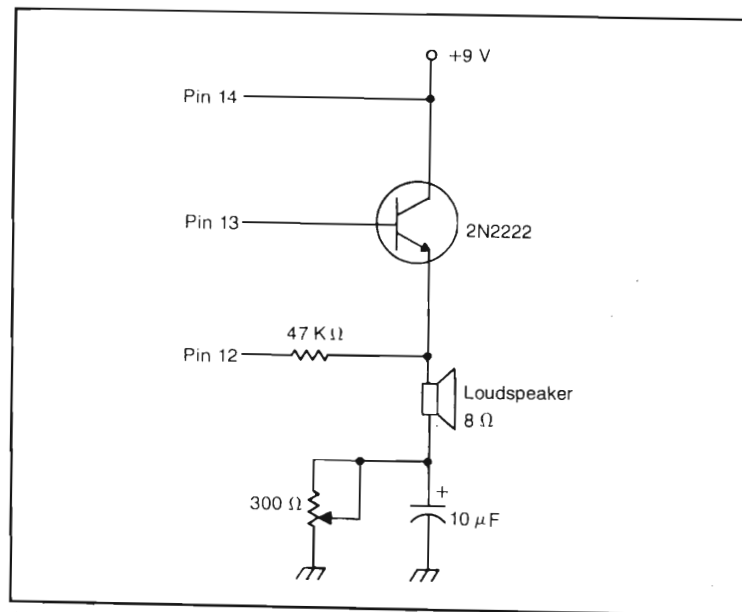


Fig. 3-73. Simple amplifier for the SN76477.

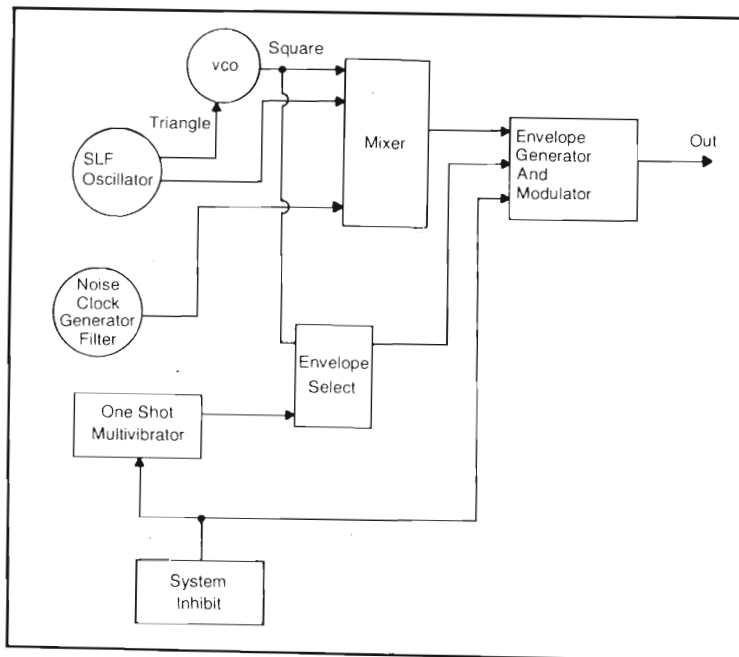


Fig. 3-74. SN76477/88 Sound Effects Generator.

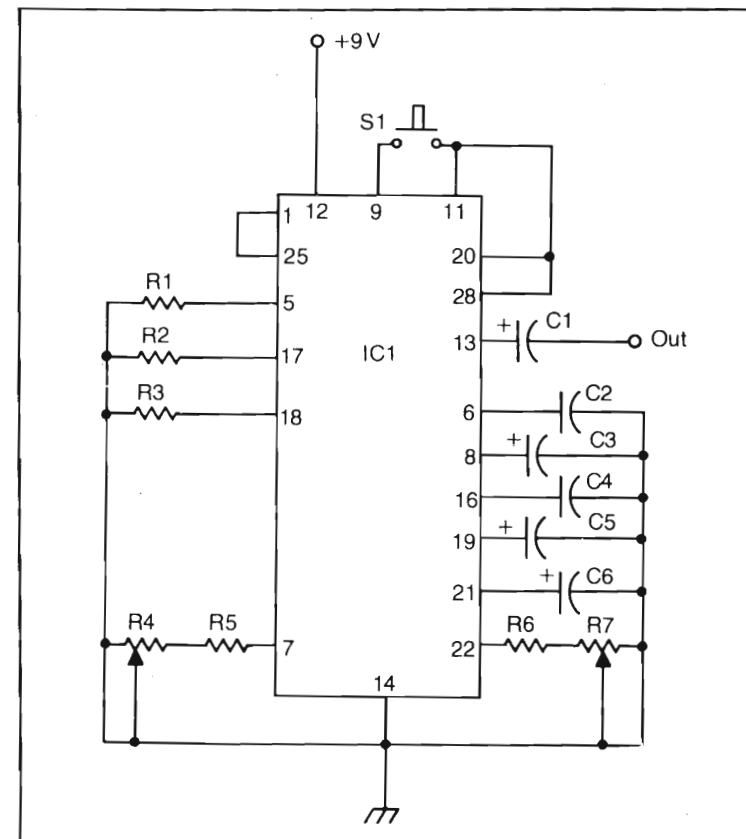


Fig. 3-75. Sound effect circuit.

Table 3-33. Parts List for Fig. 3-75.

R1	680 kΩ resistor
R2	470 kΩ resistor
R3	1 MΩ resistor
R4	100 kΩ potentiometer
R5	330 kΩ resistor
R6	56 kΩ resistor
R7	10 kΩ potentiometer
C1	100 μF 30 V electrolytic capacitor
C2	470 pF capacitor
C3	2.2 μF 30 V electrolytic capacitor
C4	0.0047 μF capacitor
C5	0.33 μF capacitor
C6	33 μF 30 V electrolytic capacitor
S1	SPST Normally Open push-button switch
IC1	SN76488N sound effects generator IC

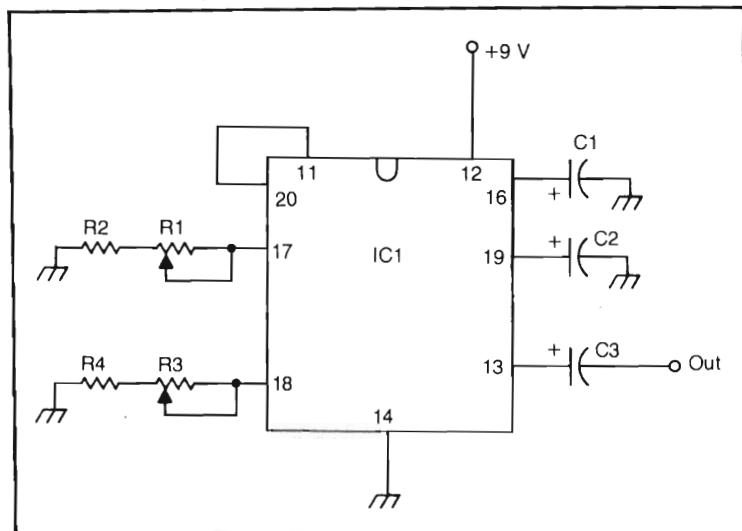


Fig. 3-78. Sound effect circuit.

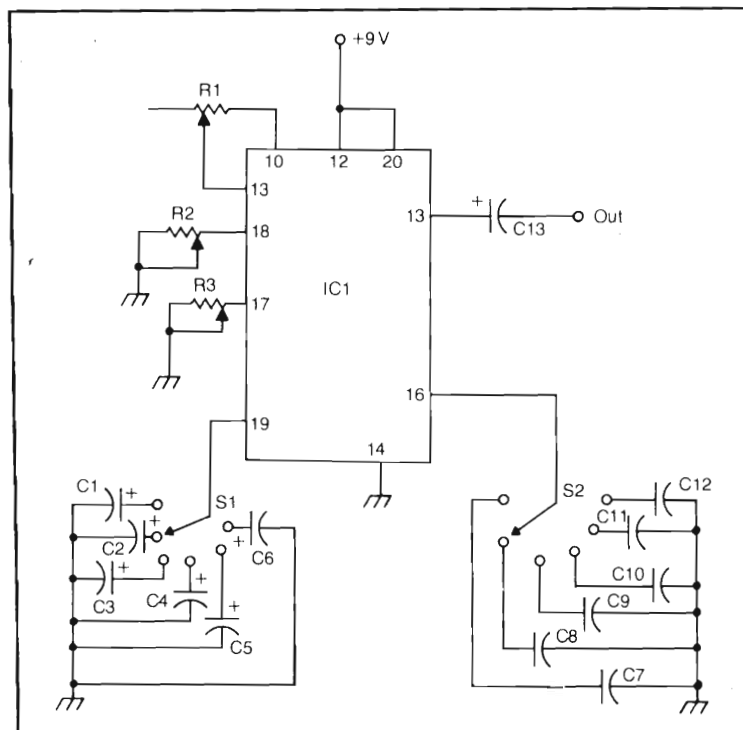


Fig. 3-79. Sound effect circuit.

Table 3-37. Parts List for Fig. 3-79.

R1	10 k Ω potentiometer
R2	500 k Ω potentiometer
R3	250 k Ω potentiometer
C1	2.2 μ F electrolytic capacitor
C2	5 μ F electrolytic capacitor
C3	10 μ F electrolytic capacitor
C4	22 μ F electrolytic capacitor
C5	47 μ F electrolytic capacitor
C6, C13	100 μ F electrolytic capacitor
C7	0.001 μ F capacitor
C8	0.0047 μ F capacitor
C9	0.01 μ F capacitor
C10	0.022 μ F capacitor
C11	0.047 μ F capacitor
C12	0.1 μ F capacitor
S1, S2	Single-pole/6 throw rotary switch
IC1	SN76488N complex sound generator IC

EXTERNAL INPUT SIGNALS

While most electronic music begins with some form of oscillator, almost any ac signal in the audio range can be manipulated electronically for synthesis effects.

The signal from the pickup of an electric guitar is often used. Any sound that can be picked up by a microphone can conceivably be processed through synthesis modules.

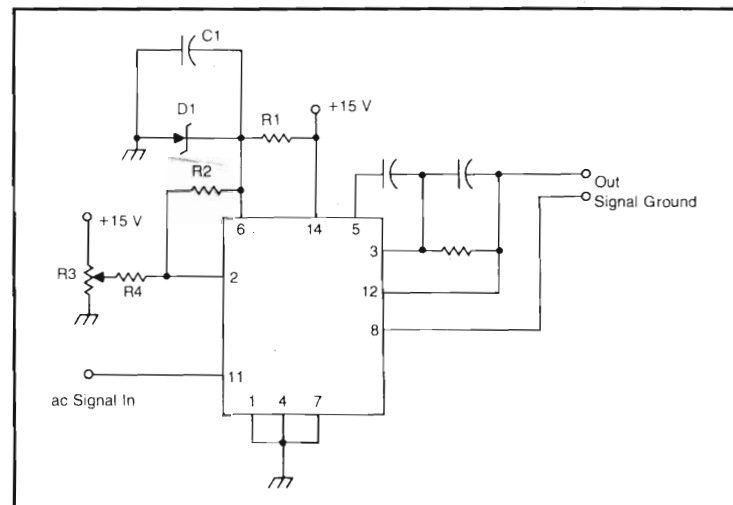


Fig. 3-80. Frequency-to-Voltage converter.

You should use care when applying external signals to an electronic music synthesizer. If the signal level is too high, distortion will result, and some components could be damaged. High level signals should be passed through an attenuator before being processed by the synthesizer.

On the other hand, a too low level signal could pick up an objectionable amount of noise (in the conventional sense). It's even possible that an input signal could be too weak to drive a module at all, in which case the output would be zero. If you run into this kind of problem, you should add a preamplifier.

The most common use of an external signal is as the starting point for the synthesized sound. External signals can also be put to work as control voltages. Here is where we can use the other mode of the 9400 Voltage-to-Frequency/Frequency-to-Voltage Converter described earlier.

The circuit shown in Fig. 3-80 accepts an input signal (almost any waveform will be acceptable) and produces a voltage at the output that is directly proportional to the frequency of the input signal. For example, a guitarist can use the phrasing of the notes of a guitar to control an oscillator and can produce a completely electronic sound.

The parts list for the Frequency-to-Voltage converter circuit is given in Table 3-38.

Table 3-38. Parts List for the Frequency-to-Voltage Converter in Fig. 3-80.

R1, R2	10 k Ω resistor
R3	100 k Ω potentiometer
R4	470 k Ω resistor
D1	5.1 V zener diode
IC1	9400 V-F/F-V converter IC

As you can tell by the length of this chapter, there are many ways to initiate a signal in an electronic music synthesizer. In a sense, we have barely scratched the surface of the possibilities, although there are certainly enough circuits in this chapter to get you started.

In the following chapters, we will examine ways that these signals may be electronically manipulated to create new sounds.

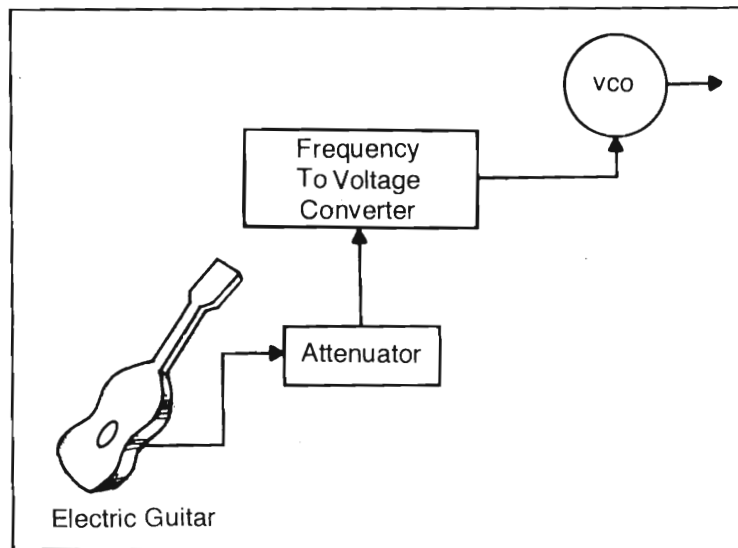


Fig. 3-81. Driving a vco with an electric guitar.