microdrum

Linking up more or less with the minidrum published elsewhere in this issue of Elektor, this article describes the simplest member of the electronic drum family, to wit: the microdrum. In this micro version the number of instruments has been limited to two: one high and one (very) low bongo. Only two transistors are needed to make an instrument that can be connected directly to any power amplifier.

Neglecting the cost, the obvious choice of instruments for the microdrum would be a bassdrum and a snaredrum. However, the accurate imitation of a snare-drum requires quite a number of components because of the necessity for a noise generator, so that its application in a simple and, above all, inexpensive little "drumbox" is less attractive.
For this reason, the instruments chosen for the microdrum described here are a bassdrum and a high bongo. In addition, to simplify matters even more, the sound of the bassdrum was lifted by one octave so that expensive bass loudspeakers are not required for reproduction. The result is a combination of a very low and a very high bongo.

The circuit

Figure 1 shows the circuit diagram of the microdrum. The bass sound is produced by means of the oscillator comprising T_1 (this is the low bongo sound); the oscillator built around T_2 represents the high bongo. Both oscillators are so designed that they are inoperative when the push button switches S_1 and S_2 are open. As can be seen in the diagram, the oscillators are of identical design. If S_1 or S_2 is pressed, a positive pulse appears on the base of the corresponding transistor. The shape of this pulse is determined by a circuit consisting of C_1, R_1 and C_2 for the bass oscillator and R_{12} and C_7 for the bongo oscillator. In contrast to the bass, the bongo has no parallel capacitor across R_{12}; hence the sound of this instrument is sharper.
The discharge time, and thus the duration of the pulse, is determined by the values of R_5 and R_6, and R_{17} and R_{16} respectively. The pitch of the bass oscillator depends on the values of C_3, C_4 and C_5; the pitch of the bongo is governed by the values of C_8, C_9 and C_{10}. Where C_3, C_4 and C_5 are concerned, the best values found to lie between 10nF and 47nF; the best values for C_8, C_9, and C_{10} are between 4n7 and 10nF.
Of course, everybody is quite free to experiment with other capacitor values. A higher value for the capacitors gives a lower tone.
The signals are taken from the collectors of the two transistors and fed to the output via capacitors (C_6,C_{11}) and resistors (R_9,R_{20}). The sound levels of the bass (i.e. low bongo) and the high bongo can be adjusted to taste by experimenting with the values of R_9 and R_{20}.
The rms output voltage of the microdrum is about 1 V; the minimum load impedance is 18k, so the combination can be connected to almost any power amplifier. The supply voltage can lie between about 15 V and 24 V. If mains supply is used, it need not be stabilized. As the total current consumption is no more than about 5mA, the apparatus also performs well when fed from torch batteries. Even if used intensively, these batteries will last for months.
Figure 2 shows the printed circuit, and figure 3 shows the component arrangement. The modest dimensions (abt 7.5 x 5 cm) leave ample possibilities in choosing a suitable cabinet.

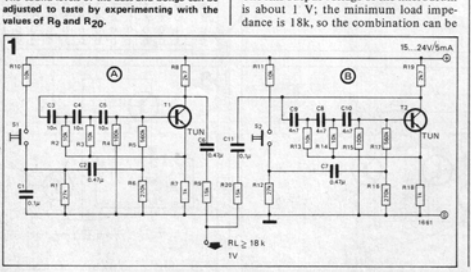

Figure 1. Circuit diagram of the microdrum. The sound levels of the bass and bongo can be adjusted to taste by experimenting with the values of R_9 and R_{20}.

Additions

As already explained, the sound of the instruments can be changed by using other values for the capacitors C_3, C_4 and C_5 (for the bass), and for C_8, C_9 and C_{10} (for the high bongo). It will be clear that further experimentation can lead to entirely different instruments whilst using the same oscillators.
A few short tests carried out in the

Parts list

Resistors
R_1,R_{12} = 27k
R_2,R_3,R_{10},R_{11},R_{13},R_{14} = 10k
R_4,R_{15} = 100k
R_5,R_{17} = 560k
R_6,R_{16} = 270k
R_7,R_{18} = 1k
R_8,R_{19} = 2k7
R_9,R_{20} = 15k (see text)

Capacitors
C_1,C_{11} = 0.1 μ
C_2,C_6,C_7 = 0.47 μ
C_3,C_4,C_5 = 10n (see text)
C_8,C_9,C_{10} = 4n7 (see text)

semiconductors
T_1,T_2 = TUN

Miscellaneous
S_1,S_2 = single pole push button switch

Elektor laboratories have indicated that changing the values of C_8, C_9 and C_{10} to 2n7, produces a sound rather like wooden blocks.
It might therefore be attractive to extend the microdrum with one or more identical p.c. boards, each with different capacitors.

Figure 2. A simple, yet complete electronic musical instrument on a printed circuit board of no more than 7.5 × 5 cm!

Figure 3. Component arrangement on the board of figure 2.