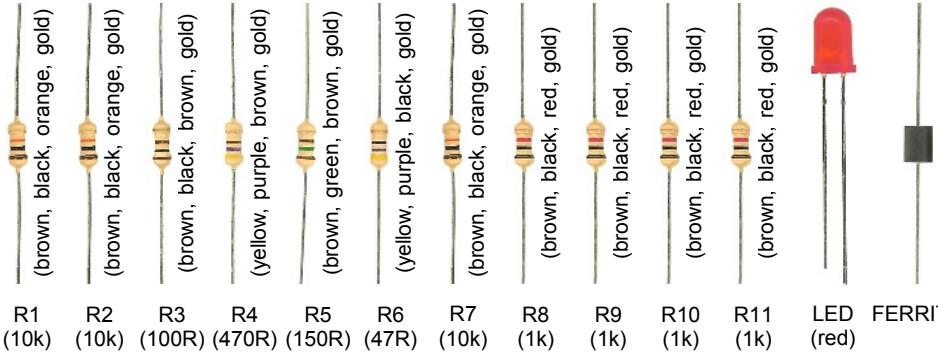
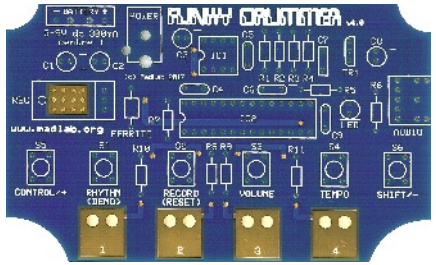
Funky Drummer

programmable rhythm machine with 40 drum sounds



R1 (10k) R2 (10k) R3 (100R) R4 (470R) R5 (150R) R6 (47R) R7 (10k) R8 (1k) R9 (1k) R10 (1k) R11 (1k) LED (red) FERRITE



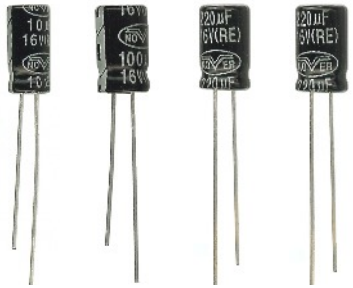
IC2 (dsPIC33E)

IC2 socket

IC1 (MCP4921)

IC1 socket

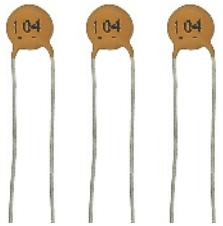
Battery snap



C1 (10u) C2 (100u) C3 (220u) C8 (220u)

C7 (100n)

C6 (10u)



C4 (100n) C5 (100n) C9 (100n)

REG (LD33V)

POWER

AUDIO

TR1 (ZTX689B)

S1

S2

S3

S4

S5

S6

1. Identify the different components using the spotter chart.
2. Fit and solder all the resistors (R1 to R11) to the circuit board. Identify the resistors by the coloured stripes on the body. They can be fitted either way around.
3. Solder the chip sockets (IC1 and IC2) matching the notch in the socket to the notch on the board. **Do not solder the chips directly to the board.**
4. Fit and solder the electrolytic capacitors (C1, C2, C3 and C8) to the board putting the shorter leg into the hole with the – sign. The shorter leg also has a stripe on the side of the body. Also solder the tantalum capacitor (C6) so that the shorter leg is by the – sign. Fit and solder the remaining ceramic (C4, C5 and C9) and polyester (C7) capacitors either way around.
5. Solder the ferrite bead (FERRITE) either way around.
6. Solder the light (LED) to the board putting the shorter leg into the hole with the line. The shorter leg also has a flattened edge on the rim.
7. Solder the pushbuttons (S1 to S6) either way around.
8. Solder the transistor (TR1) matching the half-circle shape of the transistor to the half-circle shape on the board.
9. Bend the legs of the regulator (REG) at right angles and solder it such that the metal heatsink is flat on the board and the side with the writing is facing upwards.
10. Solder the jack socket (AUDIO).
11. Solder the power socket (POWER). (You might find it easier to solder the largest hole if you use a small piece of wire as a bridge.) Optionally also fit the PP3 battery snap (BATTERY). Push the battery snap leads up through the larger holes in the board from the metal side of the board. Fit the metal tip of the red lead into the BATTERY + hole and the metal tip of the black lead into the BATTERY – hole. Solder the metal tips to the tracks on the board then pull the wire loops back.
12. Carefully bend the legs of the chips inwards a little with your fingers. Fit the chips into their sockets matching the small notch in the chip to the notch in the socket.
13. Attach the self-adhesive rubber feet around the edge of the board.

continued overleaf

14 Either connect a mains power supply (5-9V regulated dc, 300mA, centre +) to the power socket or a PP3 battery to the battery snap. The software includes a power-on self-test. The LED should flash twice if *Funky Drummer* is working correctly.

15 Connect headphones or powered speakers (with a 3.5mm jack plug) to the audio output socket. Tap the touch pads with your finger and you should hear different drum sounds. You can connect external objects such as pieces of fruit or vegetables to the touch pads using crocodile clip leads. Touching the objects will then sound the drums.

HOW TO USE

A particular drum sound can be associated with each of the four touch pads. Pressing the associated pushbutton (S1 to S4) selects a touch pad (1 to 4) to change. Then pressing the **+** or **–** pushbuttons selects a particular drum, stepping forwards or backwards through the 40 available drum sounds. Finally pressing the same pushbutton again fixes the association.

Pressing **CONTROL** + **VOLUME** increases the volume, **SHIFT** + **VOLUME** decreases the volume. Pressing **CONTROL** + **SHIFT** + **VOLUME** toggles gain x 2 (double output voltage).

Pressing **CONTROL** + **SHIFT** + **TEMPO** recalibrates the touch pads. Do this when you add external touch objects using crocodile clip leads.

Settings are saved to non-volatile memory. **CONTROL** + **SHIFT** + **RESET** restores all settings to the factory defaults. Note that user rhythms are not restored though.

Funky Drummer can output an audio signal on its jack socket which has a maximum peak-to-peak of about 2 volts. This is more than capable of producing a loud sound in a pair of 32-ohm impedance headphones.

The sensitivity of the touch pads can be adjusted by pressing and holding down one of the pushbuttons during power up (until after the self-test has completed). Six settings are available and are suitable for different physical arrangements of external touch pad connections.

Rhythm Mode

Pressing **CONTROL** + **RHYTHM** plays the current rhythm or selects the next rhythm if a rhythm is already playing. Pressing **SHIFT** + **RHYTHM** plays the current rhythm or selects the previous rhythm if a rhythm is already playing. 12 preset rhythms and 4 user rhythms are available.

The LED flashes at the start of the rhythm loop. Pressing any pad pushbutton (S1 to S4) stops the rhythm playing.

CONTROL + **TEMPO** increases the rhythm tempo (with auto repeat), **SHIFT** + **TEMPO** decreases the tempo (with auto repeat).

CONTROL + **SHIFT** + **DEMO** plays all the preset rhythms in turn. Any pad pushbutton (S1 to S4) exits demo mode.

Record Mode

CONTROL or **SHIFT** + **RECORD** selects record mode and allows the user rhythms to be edited.

The LED flashes at the start of the rhythm loop and a metronome click sounds on each beat of 4 beats. The touch pads record drum sounds at the current point in the rhythm loop.

Recording is at one quarter speed, and a maximum of 64 drum events per beat can be recorded.

Pressing one of the pad pushbuttons (S1 to S4) exits record mode and stores the rhythm as one of the 4 user rhythms.

Table 1 - drums

closed hihat	open hihat	high tom #1	high tom #2	high tom #3
low tom #1	low tom #2	snare #1	snare #2	snare #3
snare #4	bass #1	bass #2	bass #3	high conga
low conga	high bongo	low bongo	high agogo	low agogo
crash cymbal	taiko	timpani	timbale	china cymbal
cabasa	brush #1	brush #2	snap	clap
cowbell	triangle	gunshot	scratch	whistle
kalimba	rimshot	chicken	bubble	quijada

Table 2 - rhythms

8beat #1	8beat #2	8beat #3	8beat #4
jazz	shuffle	reggae	samba
disco #1	disco #2	elec pop	pattern #1
user #1	user #2	user #3	user #4