

Door-Knock or Vibration Alarm



PRADEEP G.

This is a simple circuit that activates an alarm when there is a knock on the door or there are any vibrations due to movement of heavy goods or furniture. The circuit uses readily available components.

Circuit and working

The circuit is built around quad-opamp LM324 (IC1), which is configured in amplifier mode. It uses the piezoelectric element of a piezo buzzer as the input sensor, two transistors BC547 (T1 through T2), a piezo buzzer and some other components for the alarm circuit.

PARTS LIST

Semiconductors:

IC1	- LM324 quad op-amp
T1-T2	- BC547 npn transistor
D1	- 1N4007 rectifier diode
LED1	- 5mm LED

Resistors (all 1/4-watt, $\pm 5\%$ carbon):

R1	- 1.2-kilo-ohm
R2	- 100-kilo-ohm
R3, R5, R6	- 4.7-kilo-ohm
R4	- 10-kilo-ohm
R7	- 1-kilo-ohm
VR1	- 1-mega-ohm potmeter

Capacitors:

C1	- 1nF ceramic disk
C2	- 220nF ceramic disk
C3	- 10 μ F, 25V electrolytic
C4	- 470 μ F, 25V electrolytic
C5	- 1000 μ F, 25V electrolytic

Miscellaneous:

CON1	- 2-pin terminal connector
CON2	- 2-pin connector
PZ1	- Piezo buzzer
	- Piezoelectric element used in piezo buzzer
	- 9V-12V power supply
	- 14-pin IC base

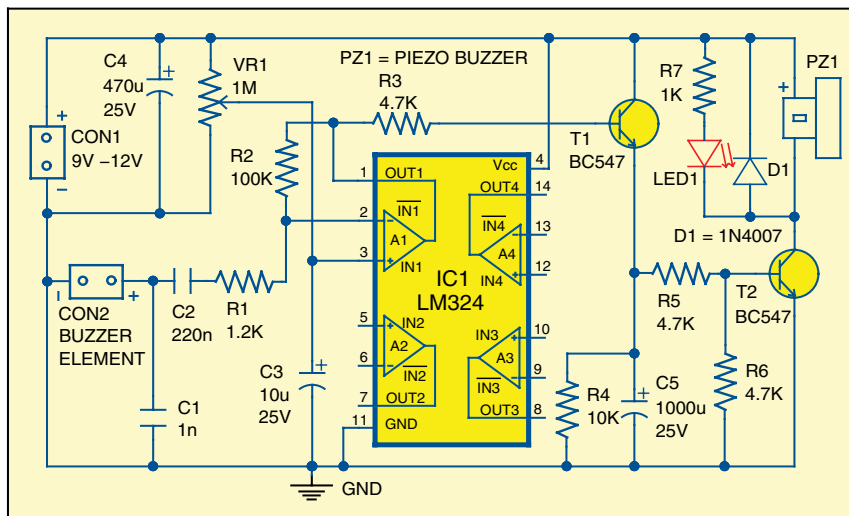


Fig. 1: Circuit diagram of a door-knock alarm

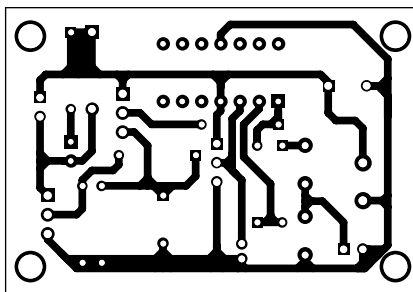


Fig. 2: An actual-size PCB layout of the circuit

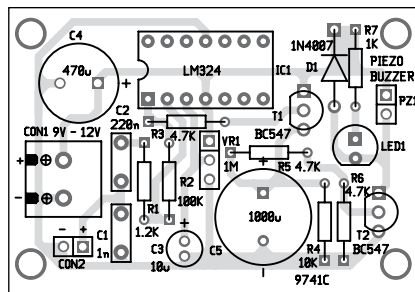


Fig. 3: Component layout of the PCB

Fig. 1 shows the circuit diagram of the door-knock alarm.

The reference voltage at pin 3 of IC1 is set by trimming potmeter VR1. The piezoelectric element plate is fixed at the centre of the door using cello tape. Apply a small quantity of adhesive on the edges between the plates. Wires from the piezo element are connected at CON2. These generate an input pulse when vibrations are caused by knocking on the door. The pulse is amplified by op-amp A1 of IC1. Remaining three op-amps of quad IC LM324 are not used here.

The output of A1 of LM324 from pin 1 is further amplified by transistors T1 and T2 to drive the piezo buzzer or relay. Because of the presence of high-value capacitor C5, the buzzer

remains active for a few seconds. The circuit is powered by 9V/12V power supply. Sensitivity of the circuit can be adjusted by 1M potmeter VR1.

In place of piezo buzzer PZ1, you can use 9V/12V single-changeover relay connected to an amplifier for louder sounds.

Construction and testing

An actual-size, single-side PCB for the alarm is shown in Fig. 2 and its component layout in Fig. 3. After assembling the circuit on the PCB, enclose it in a suitable plastic box.

Before using the circuit, ensure that supply voltage is correct. ●

The author is B.Sc. physics graduate and a regular contributor to various magazines

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