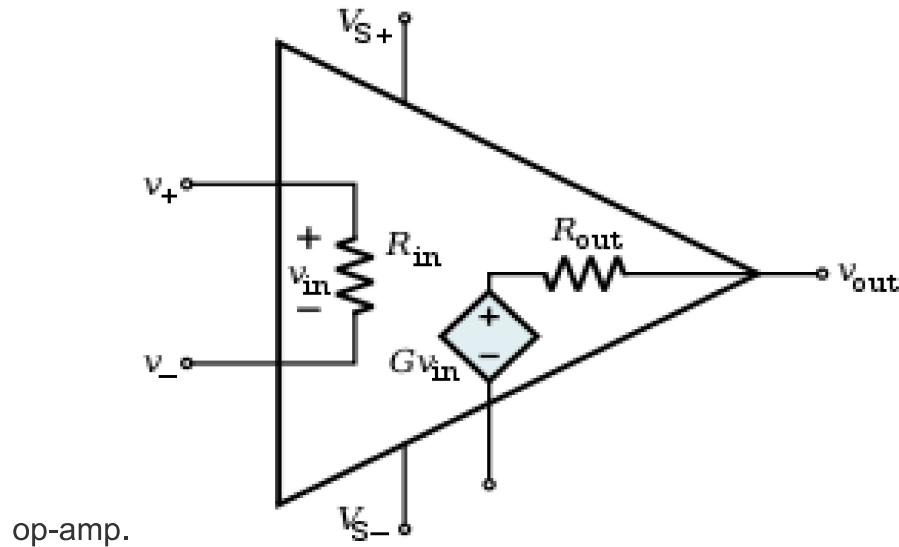# Sound Operated Flip Flop

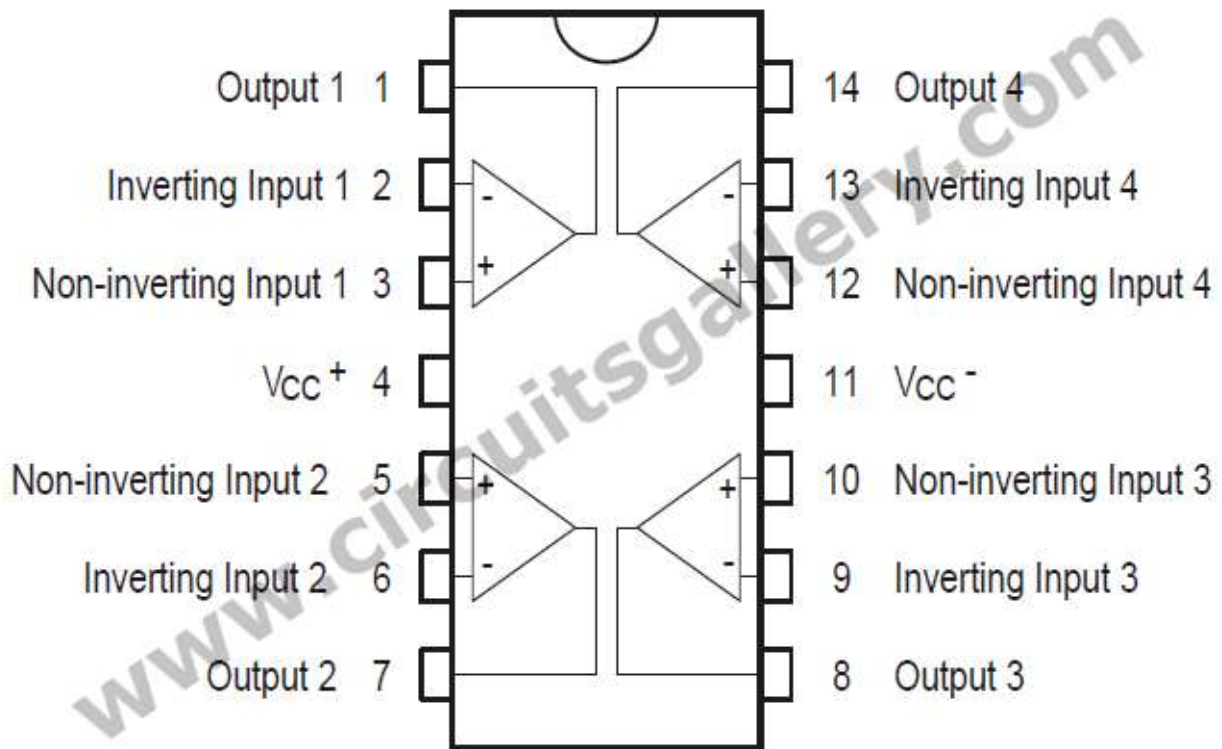**Aim :-**

      To control the output of flip flop by sound.

COMPONENTS REQUIRED :-

1.I C'S– LM324,7476(JK FLIP FLOP)
2.Resistors- (4X10K),(2X100),(1X100K),(1X1M),(1X4.7K)
3.Capacitors-(2X0.1uF),(1X1uF),(1X0.47uF),(1X100uF)
4. Electret Condenser microphone
5.LED

  LM324:-

 is a 14pin IC consisting of four independent operational amplifiers (op-amps) compensated in a single package. Op-amps are high **gain** electronic voltage **amplifier** with differential input and, usually, a single-ended output. The output voltage is many times higher than the voltage difference between input terminals of an

op-amp.

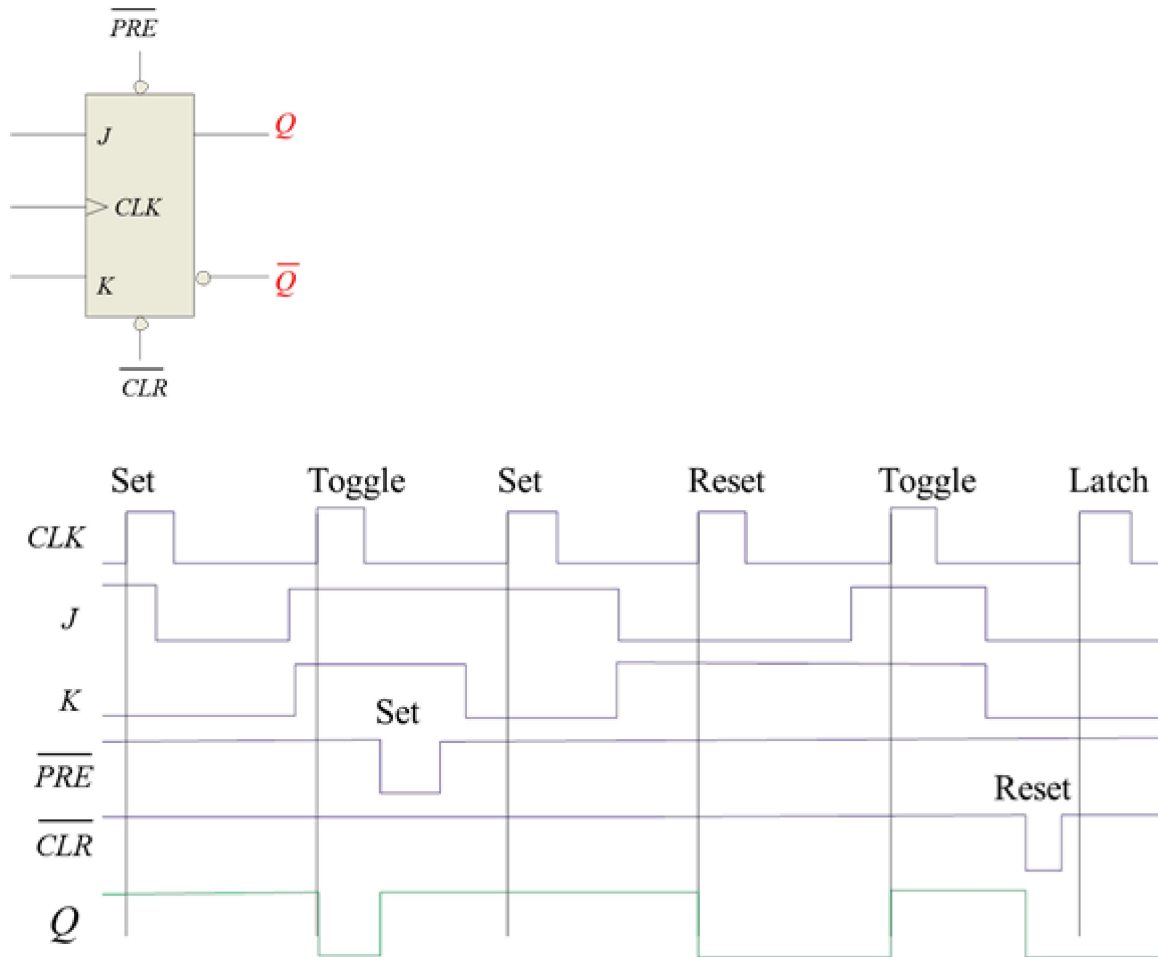|			
Output 1	1	14	Output 4
Inverting Input 1	2	13	Inverting Input 4
Non-inverting Input 1	3	12	Non-inverting Input 4
Vcc $^+$	4	11	Vcc $^-$
Non-inverting Input 2	5	10	Non-inverting Input 3
Inverting Input 2	6	9	Inverting Input 3
Output 2	7	8	Output 3

These op-amps are operated by a single power supply **LM324** and need for a dual supply is eliminated. They can be used as amplifiers, comparators, oscillators, rectifiers etc. The conventional op-amp applications can be more easily implemented with LM324.

Integrated-Circuit J-K Flip-Flop (7476, 74LS76) :-

- The 7476 is a master—slave J-K and the 74LS76 is a negative edge-triggered J-K flip-flop.
- Both chips have the same pin configuration.
- Both chips have synchronous inputs of J, K and Cp.
- Both chips have asynchronous inputs.
- The J-K flip-flop can be made into a D flip-flop by bringing the data input into the J and the inverse of the data input into the K input.
- Synchronous inputs are transferred in the triggering edge of the clock (for example the *D* or *J-K* inputs). Most flip-flops have other inputs that are *asynchronous*, meaning they affect the output independent of the clock.
- Two such inputs are normally labeled preset (*PRE*) and clear (*CLR*). These inputs are usually active LOW. A J-K flip flop with active LOW preset and CLR is shown.

PRE

J   Q

CLK

K   Q̄

CLR

Set   Toggle   Set   Reset   Toggle   Latch

CLK

J

K   Set

PRE

                                                        Reset

CLR

Q

Condenser Microphone :-

This microphone works on principle that as the distance between the two plates of capacitor is changed the current also altered. In condenser microphone one plate of capacitor is fixed. The other is light and free to move(diaphragm). As we make sound due to vibrations the diaphragm.

Output Audio Signal

Sound Waves

Front Plate (Diaphragm)   Back Plate   Battery
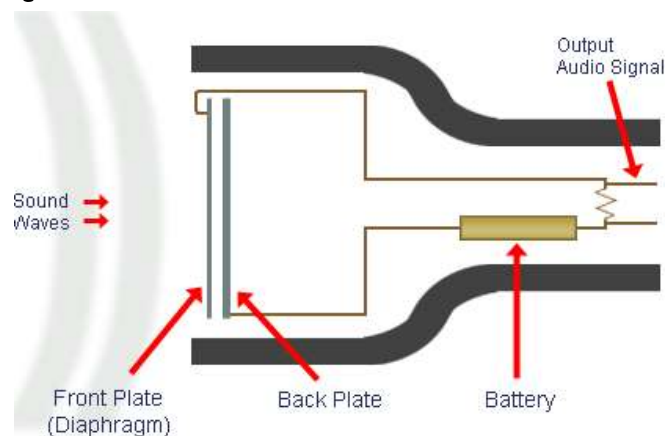
The Capacitor is initially charged by external source or in-built voltage. Then by oscillating the diaphragm the current changes .The microphone we used is electret condenser microphone.The outside surface is covered by glue materials to filter dust particles.

Description :-

The circuit given here employs a condenser microphone as the pick-up. A two-stage amplifier built around a quad op-amp IC LM324 offers a good gain to enable sound pick-up upto four metres. The third op-amp is configured as a level detector whose non-inverting terminal is fed with the amplified and filtered signal available at the output of the second op-amp. The inverting input of the third op-amp is given a reference voltage from a potential divider consisting of a 10k resistor and a 4.7k preset. The 100-ohm resistance in series with the potential divider ensures against the mis-triggering of the circuit by noise. Thus by adjusting the preset one can control the sensitivity (threshold) of the circuit. The sensitivity control thus helps in rejecting any external unwanted sounds which may be picked up by the amplifier. The output of the level detector are square pulses which are used to trigger a flip-flop. The 100mF capacitor connected across the supply also helps in bypassing noise.

Circuit diagram with Parts list.
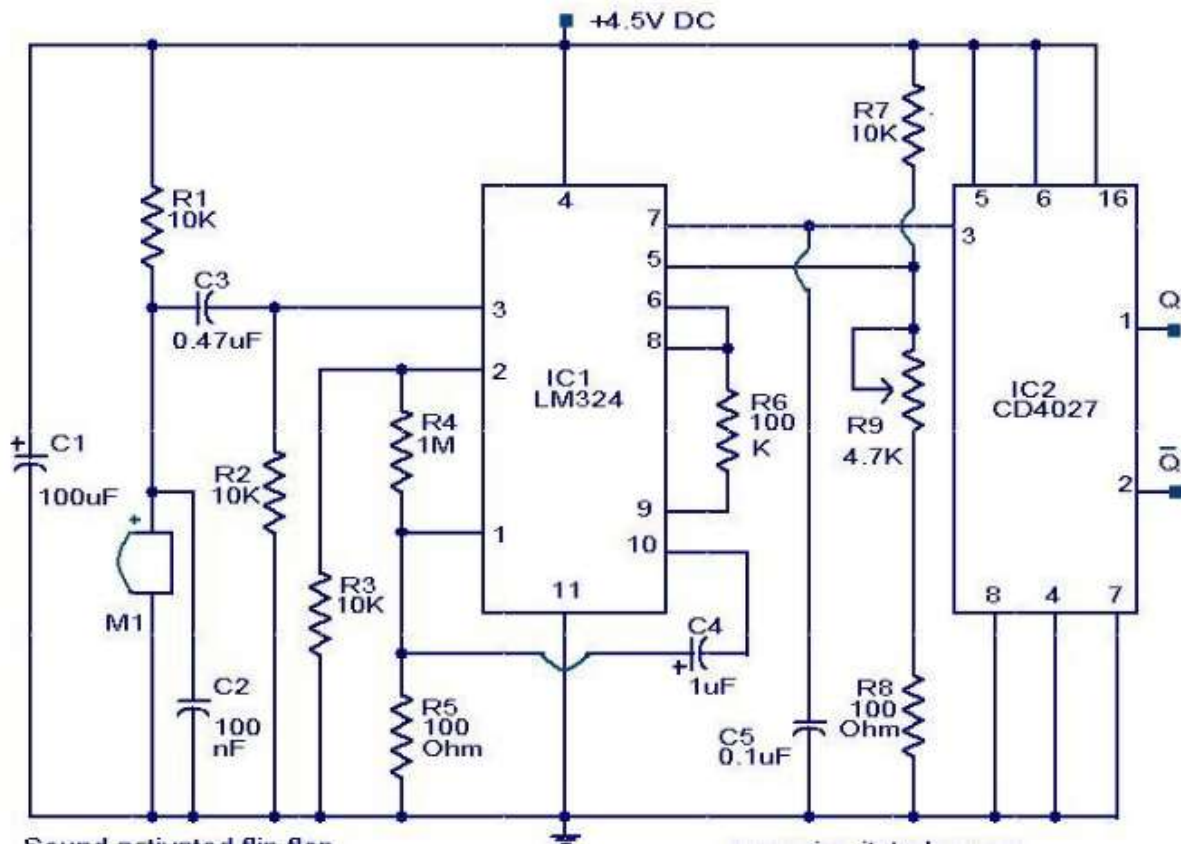
In the figure there was CD4027 but we used 74LS76(master slave jk flip flop) as there were no CD4027 IC's availible in lab.

Problems we faced :-

We didnot check the IC's this made us to arrange circuit for more than 10 times.

Applications :-
- It can be used as switch.
- We know that by making it as switch there will be many uses(operating lights, fans etc)

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