

# High Sensitive Low Power Electronic Ear

(Poor Man's Hearing aid)

Normally, hearing aid circuits consume battery power continuously once they are switched on. This project is designed to save battery power by switching on the sound amplifier section only when sound is detected. The sensitivity of the detection section and the 'on' time duration of the sound amplifier circuit can be set by the user. Also the circuit uses only a single condenser mic for sound detection and amplification. This hearing aid project consists of a condenser microphone, earphone, and sound detection and amplification sections. The sound detection section employs a quad op-amp and a timer. The sound signal received at the mic is pre-amplified by transistor BC549. The voltage at its collector is fed to the inverting terminal of op-amp, which is used as a comparator. The reference voltage ( $V_{ref}$ ) at the non inverting terminal is set using a preset. The preset is also used to control the sensitivity of the sound signals received by the circuit. The output is fed to the trigger input of timer, which is configured in monostable mode. When sufficient sound signal strength is detected at the base of transistor, it triggers the Opamp.

The sound amplifier is designed using NPN transistors. The sound signal received from the mic is fed to the non-inverting pin of the second op-amp which is wired in unity follower configuration. The unity follower mode resolves the problem of impedance mismatch which would have occurred if the output of the mic is fed directly to amplifier stage. The output is fed to the base of transistor. The weak signal received at transistor is further amplified by another stage of amplifiers. An earphone to listen to the sound is connected at the output. With 9V DC supply, when sound is detected through the mic, the amplifier section is automatically triggered and the current consumption of the circuit is about 96 mA. When the amplifier circuit is 'off,' the circuit draws a current of about 6 mA only, thus saving considerable amount of battery power.

