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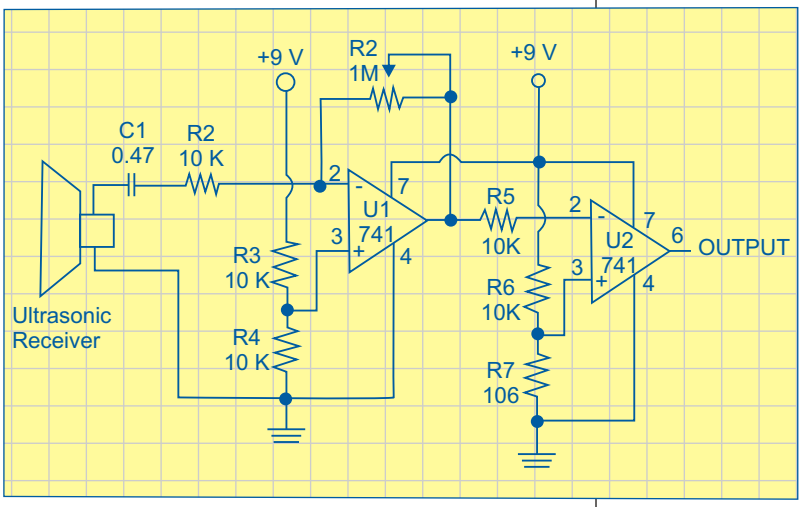
Ultrasonic Receiver

The ultrasonic waves are the ultrasound waves. The band of the frequency of ultrasonic waves lies above 20 Khz, which is above the band of frequency that human beings can hear. Thus though the ultrasonic waves exist in atmosphere, they cannot be heard. The speed of transmission of ultrasonic waves depends on the media through which they are passing. The devices that use ultrasonic waves for the measurement of certain parameters are called as the ultrasonic transducers. The measurement devices using the ultrasonic waves comprise of the two major parts.



One part of the device transmits the ultrasonic waves and the other part of the devices receives the ultrasonic waves.

The ultrasonic receiver used in this circuit is one designed to vibrate optimally at about 40 kHz, the transmitter paired with this receiver must also transmit 40 kHz waves. When these waves hit the receiver, the receiver vibrates and produces electric impulses, also at 40 kHz.

The ultrasonic signal which was received with the reception sensor is amplified by 100 times(40dB) of voltage with the operational amplifier at the first stage.This amplified output is then given to the comparator. The operational amplifier amplifies and outputs the difference between the positive

input and the negative input. Voltage at the non-inverting input is considered to be reference.The two inputs are compared at U1. When voltage at pin 2 of U1 exceeds the Vref, the output voltage goes to negative saturation because the voltage at the (-) input is greater than at the (+) input. On the other hand, when vin is less than Vref the output voltage goes to positive saturation. Both the satges operate at 9V.The non-inverting input of second stage is kept at a voltage calculated by

Vrf=(10K*9V)/(10K+10K)
=4.5V

When the rectified ultrasonic signal becomes greater than 4.5V,The output goes low.This circuitry can be used in a distance measurement circuit where an object distance can be calculated using ultrasonic waves.

The specification of sensor used are

Center frequency(KHz)	40.0±1.0KHz
Capacitance (pF)	2100±20%pF
Beam Angle	80°typical
Sound Pressure Level(dB)	≥115dB
Sensitivity (dB) 0dB=1volt/μbar	≥-65dB
Max. Driving Voltag(RMS)	20Vrm
Working Temperature (°C)	-20 to +70
Storage Temperature (°C)	-30 to +80