

VOLTAGE TO FREQUENCY CONVERTER

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Abstract- for generating a saw tooth waveform, we have used 555 timer IC and lm741 op-amp IC. In this circuit, we are using 555 IC as a source for digital output. The digital output is given as input for the lm 741 to produce saw tooth waveform. Here the 555 timer IC is used in astable mode.

keywords-555IC, lm741.

REFERENCE CIRCUIT DETAILS

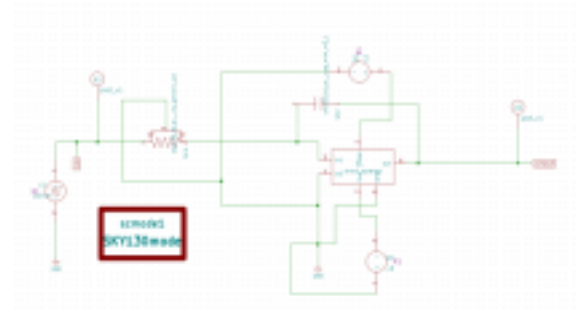
Here the IC NE555 is wired as an astable multivibrator with unequal ON and OFF times. The resistor R1, R2 and capacitor C2 sets the ON and OFF time periods. The value of these components are so selected that the OFF time is less than 10% of the ON times. The asymmetric square wave is available at pin 3 of the IC. The working of the astable multivibrator is given below.

When the power supply is switched ON, capacitor C1 starts charging through resistors R1 and R2. When the voltage across C1 is above $\frac{2}{3}V_{cc}$ the upper comparator inside the NE555 swings to positive saturation and this triggers the internal flip-flop. This makes the output (pin 3) of the timer low. Now the capacitor C1 starts to discharge through resistor R2 into pin 7 of the IC. When the voltage across capacitor C1 becomes less than $\frac{1}{3}V_{cc}$, the lower comparator inside the IC switches to positive saturation and this again triggers the internal flip-flop. As a result the output of the timer (pin 3) goes low. This action is repeated and the result will be a square wave at pin 3 of the NE555. The charging time period (ON time) is given by the equation $T_1 = 0.69(R_1 + R_2)C_1$ and the discharging time period (OFF time) is given by the equation $T_2 = 0.69R_2C_1$

The asymmetric square wave obtained at the output of NE555 is integrated by the inverting active integrator based on opamp IC uA741. Resistors R3 and R4 sets the gain of the opamp integrator. Resistor R4 in conjunction with capacitor C3 sets the bandwidth. Since the integrator is wired in inverting mode, the sawtooth waveform falls when the timer output is high and rises when the timer output is low.

CIRCUIT DESIGN

fig-1



INPUT WAVEFORM

Fig-2



OUTPUT WAVEFORM



REFERENCES:

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