Monostable Multivibrator

P.G- III

A monostable multivibrator using operational amplifier is shown in fig(1). It has only one stable state and the other state is known timing state. The one output pulse is obtained for an input pulse. The output pulse width depends only on the time constant ($R_f C$) but not on the input pulse width.

~~Opera~~

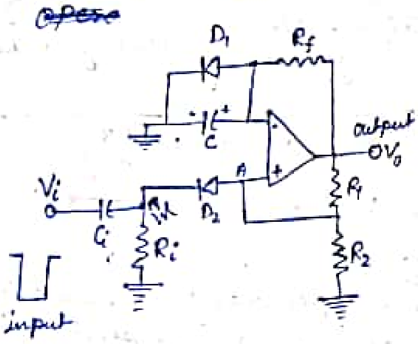

Fig (1a)

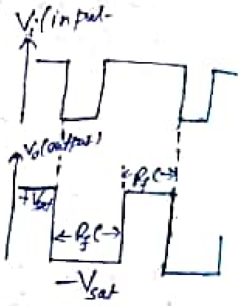

Fig (1b)

Operation:- The operation of monostable multivibrator can be ~~do~~ understood in following three steps.

(a) Stable State: When output $V_0 = +V_{sat}$, the potential at A is given by

$$V_{UT} = \frac{R_2}{R_1+R_2}(+V_{sat})$$

Here UT stands for upper transition. V_{UT} is obviously a positive voltage. The current starts flowing from output through R_f to charge the capacitor C. Diode D is forward biased so that the capacitor is charged for maximum voltage with polarity shown in fig(1). Hence this is a stable state.

(b) Transition to Timing State:- To obtain potential at point A, a differentiator i.e $R_i C_i$ high pass circuit is used. Assuming V_i to be enough negative, the voltage at point A will be negative so that the output changes from stable state ($V_0 = +V_{sat}$) to the timing state ($V_0 = -V_{sat}$).

(c) Timing State:- The output will be this state temporarily. When $V_0 = -V_{sat}$, potential at point A is

$$V_{LT} = \frac{R_2}{R_1+R_2}(-V_{sat})$$

Here lower transition voltage V_{LT} is negative and hence the diode D_1 becomes reversed biased. Therefore, the capacitor starts charging with polarity opposite to that with time constant $R_f C$.

When the voltage across the capacitor, C_1 reaches V_{LT}, then V_0 changes from $-V_{sat}$ to $+V_{sat}$. The output will be in timing state only for a time $R_f C$. The period of the output pulse is

$$T = 0.69 R_f C \simeq 0.7 R_f C.$$