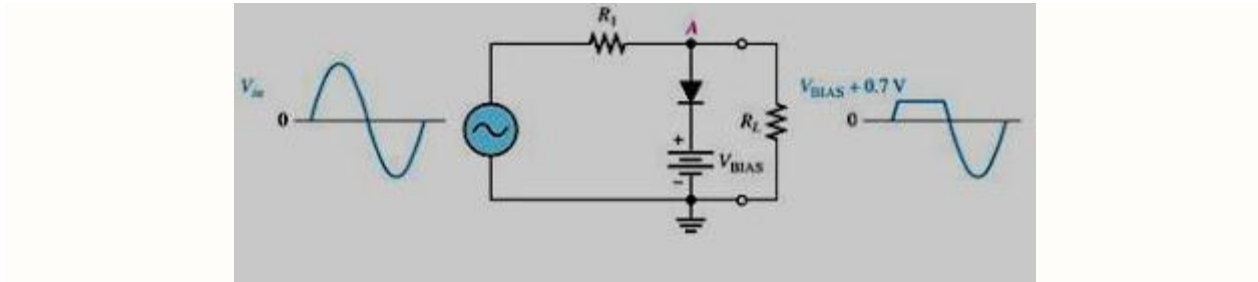


Diode Limiting and Clamping Circuits

Diode limiting and Clamping Circuits

1) Limiters:

The Diodes can be used to clip off (To cut the waveform) portions of signal voltages (above or below certain specified levels). If we want to get a wave form which is in the form of clip off, we can generate that types of wave forms by the help of diodes. In electronic circuits, diodes are considered as the limiting circuit.

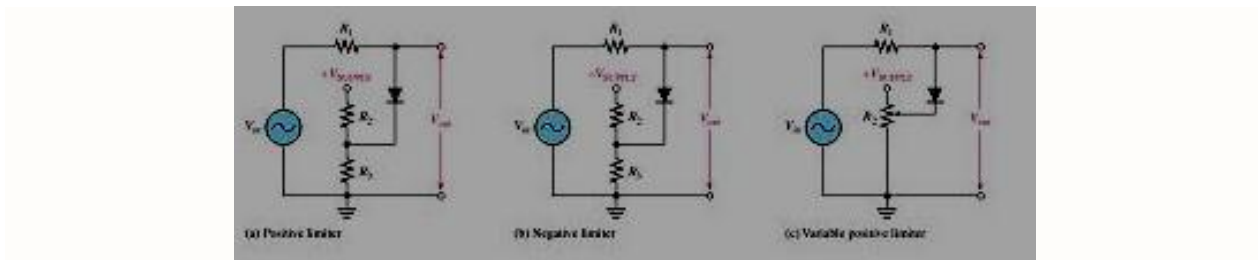


The diode will become forward biased as soon as V_A (The voltage across the positive side of the diode) becomes larger than $V_{BIAS} + 0.7$. When diode is in forward biased condition, the voltage V_A cannot become larger than $V_{BIAS} + 0.7$ V (Since the cut off voltage for silicon diode is $+0.7$ V, in order to turn the diode ON we need to apply a positive voltage of $+0.7$ Volts at the positive part of the diode for the diode to get forward biased).

Thus, the voltage across the load resistance R_L , will also be equal to $V_{BIAS} + 0.7$.

When diode is in reverse biased condition, it appears as an open circuit (since the positive part of the diode is always getting a negative voltage in the reverse biased condition), so the output voltage is the voltage of R_L alone will be obtained.

With the help of a voltage divider, the desired (required) voltage levels can be attained.

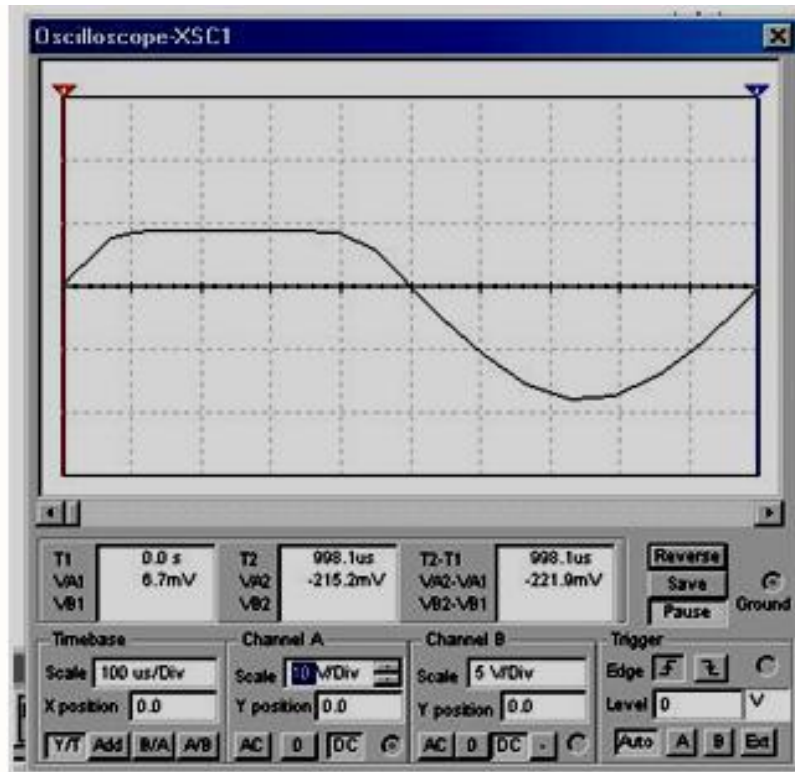


Here we replace the voltage source with a resistive voltage divider circuit.

$$V_{BIAS} = \frac{R_3}{(R_2 + R_3)} V_{SUPPLY} ;$$

V_{SUPPLY} is the supply voltage.

Example wave form for diode limiter:



b) Diode Clampers :

Any device that adds a dc level to an ac voltage is called as diode clampers.

Diode clampers are also called as dc restorers.

The diode is forward biased, when the input voltage goes initially negative,

The capacitor charges to near peak voltage of input voltage ($V_p(\text{in}) - 0.7$).

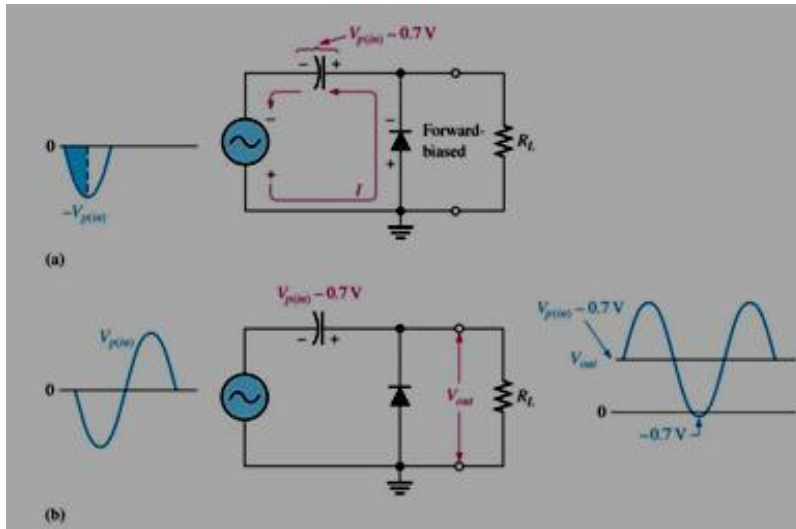
After the negative peak voltage, the diode is reverse biased (because cathode is held near $V_p(\text{in}) - 0.7$ by charge on the capacitor).

Capacitor can discharge through the load resistance (R_L) only.

The capacitor discharges very little in each period, since the load resistance has high resistance.

The time constant should be large enough (at least 10 times the period of the input voltage).

The capacitors can acts like a battery in series with the input voltage, since the capacitor retains charge.



Source:

<http://www.electronicandcommunications.com/2013/04/diode-limiting-and-clamping-circuit.html>