ELECTRONICS WORKSHOP REPORT

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The simulated circuits were:

1: Clipper Circuits:

(i) Series negative clipper-

a: Series negative clipper

b: Series negative clipper with positive V_r

c: Series negative clipper with negative V_r

(ii)Series positive clipper-

a: Series positive clipper

b: Series positive clipper with negative V_r

c: Series positive clipper with positive V_r

(iii) Shunt negative clipper-

a: Shunt negative clipper

b: Shunt negative clipper with positive V_r

c: Shunt negative clipper with negative V_r

(iv) Shunt positive clipper-

a: Shunt positive clipper

b: Shunt positive clipper with negative V_r

c: Shunt positive clipper with positive V_r

2: Clamper Circuits:

(i) Negative clamper-

a: Negative clamper

b: Negative clamper with positive V_r

c: Negative clamper with negative V_r

(ii) Positive clamper-

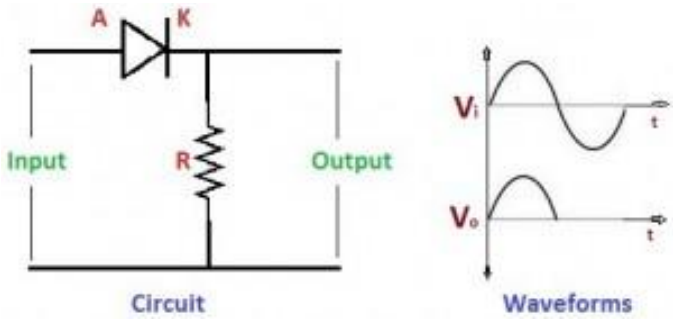
a: Positive clamper

b: Positive clamper with negative V_r

c: Positive clamper with positive V_r

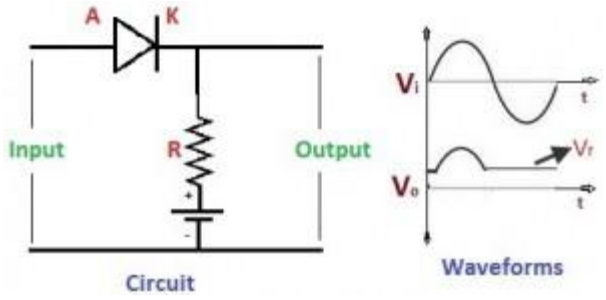
3: LED Flasher Circuit.

i: (a) Series negative clipper



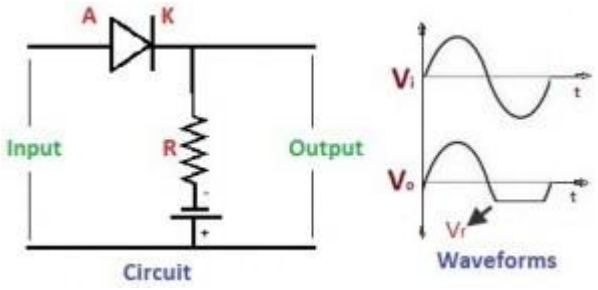
The above figure shows a series negative clipper with its output waveforms. During the positive half cycle the diode (considered as ideal diode) appears in the forward biased and conducts such that the entire positive half cycle of input appears across the resistor connected in parallel as output waveform. During the negative half cycle the diode is in reverse biased. No output appears across the resistor. Thus, it clips the negative half cycle of the input waveform, and therefore, it is called as a series negative clipper.

(b) Series negative clipper with +ve V_r



Series negative clipper with positive reference voltage is similar to the series negative clipper, but in this a positive reference voltage is added in series with the resistor. During the positive half cycle, the diode start conducting only after its anode voltage value exceeds the cathode voltage value. Since cathode voltage becomes equal to the reference voltage, the output that appears across the resistor will be as shown in the above figure.

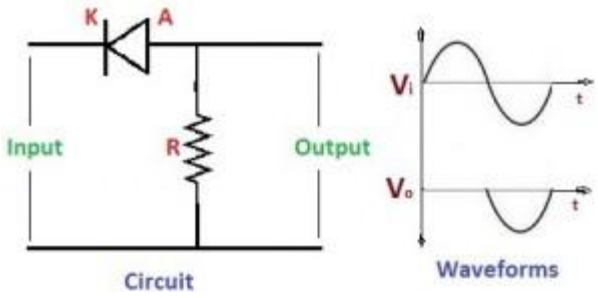
(c) Series negative clipper with –ve V_r



The series negative clipper with a negative reference voltage is similar to the series negative clipper with positive reference voltage, but instead of positive Vr here a negative Vr is connected in series with the resistor, which makes the cathode voltage of the diode as negative voltage. Thus during the positive half cycle, the entire input appears as output across the resistor, and during the negative half cycle, the input appears as output until the input value will be less than the negative reference voltage, as shown in the figure.

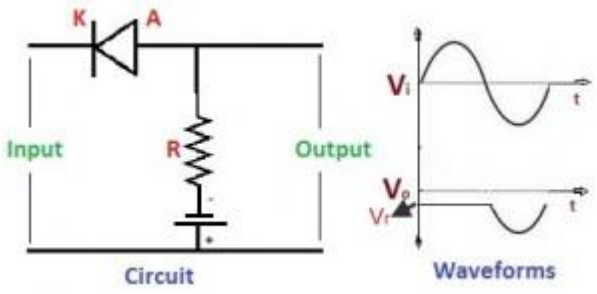
(i)

(a) Series positive clipper



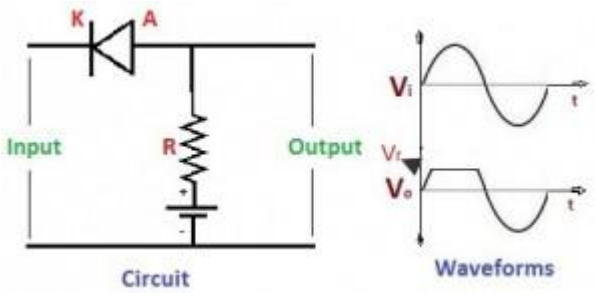
The series positive clipper circuit is connected as shown in the figure. During the positive half cycle, diode becomes reverse biased, and no output is generated across the resistor, and during the negative half cycle, the diode conducts and the entire input appears as output across the resistor.

(b) Series positive clipper with –ve V_r



It is similar to the series positive clipper in addition to a negative reference voltage in series with a resistor; and here, during the positive half cycle, the output appears across the resistor as a negative reference voltage. During the negative half cycle, the output is generated after reaching a value greater than the negative reference voltage, as shown in the above figure.

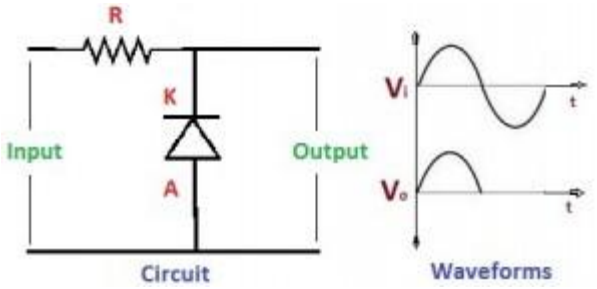
(c) Series positive clipper with +ve V_r



The series positive clipper circuit is connected as shown in the figure. During the positive half cycle, diode becomes reverse biased, and no output is generated across the resistor, and during the negative half cycle, the diode conducts and the entire input appears as output across the resistor.

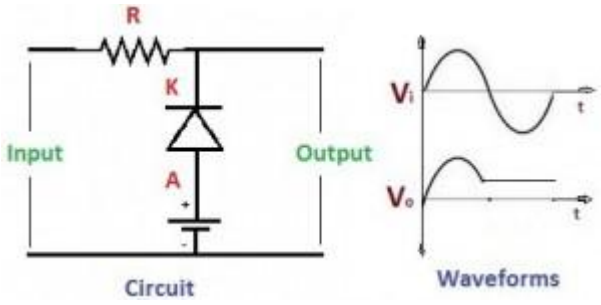
iii:

(a) Shunt negative clipper



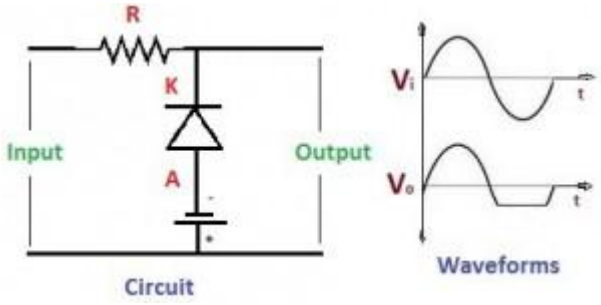
Shunt negative clipper is connected as shown in the above figure. During the positive half cycle, the entire input is the output, and during the negative half cycle, the diode conducts causing no output to be generated from the input.

(b) Shunt negative clipper with +ve V_r



A series positive reference voltage is added to the diode as shown in the figure. During the positive half cycle, the input is generated as output, and during the negative half cycle, a positive reference voltage will be the output voltage as shown above.

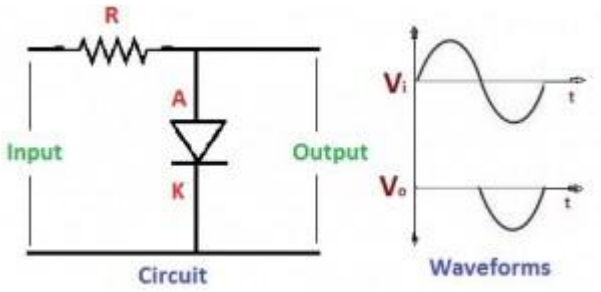
(c) Shunt negative clipper with –ve V_r



Instead of positive reference voltage, a negative reference voltage is connected in series with the diode to form a shunt negative clipper with a negative reference voltage. During the positive half cycle, the entire input appears as output, and during the negative half cycle, a reference voltage appears as output as shown in the above figure.

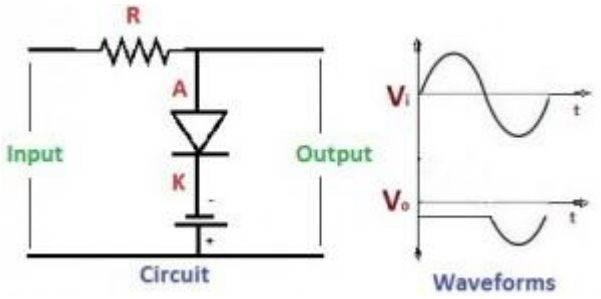
d:

(a) Shunt positive clipper



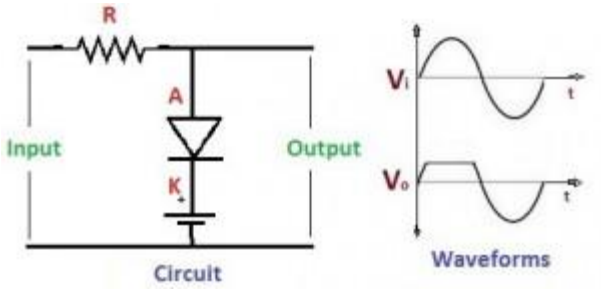
During the positive half cycle the diode is in conduction mode and no output is generated; and during the negative half cycle; entire input appears as output as the diode is in reverse bias as shown in the above figure.

(b) Shunt positive clipper with –ve V_r



During the positive half cycle, the negative reference voltage connected in series with the diode appears as output; and during the negative half cycle, the diode conducts until the input voltage value becomes greater than the negative reference voltage and output will be generated as shown in the figure.

(c) Shunt positive clipper with +ve V_r



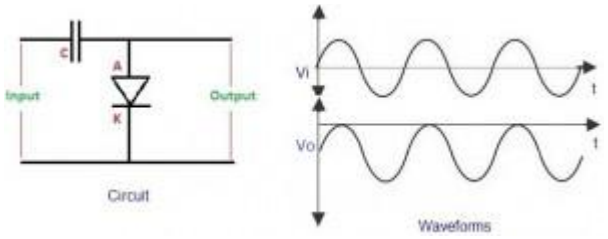
During the positive half cycle the diode conducts causing the positive reference voltage appear as output voltage; and, during the negative half cycle, the entire input is generated as the output as the diode is in reverse biased.

In addition to the positive and negative clippers, there is a combined clipper which is used for clipping both the positive and negative half cycles as discussed below.

2: (i)

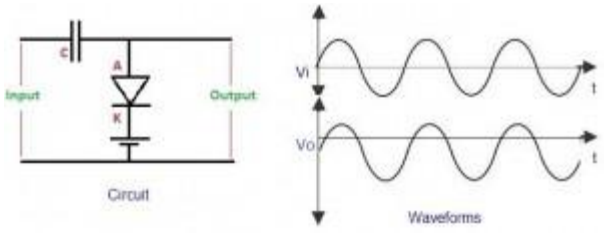
(a) Clamper Circuits-

Negative clamper



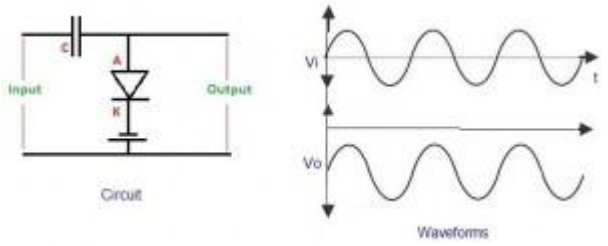
During the positive half cycle, the input diode is in forward bias- and as the diode conducts-capacitor gets charged (up to peak value of input supply). During the negative half cycle, reverse does not conduct and the output voltage become equal to the sum of the input voltage and the voltage stored across the capacitor.

(b) Negative clamper with +ve V_r



It is similar to the negative clamper, but the output waveform is shifted towards the positive direction by a positive reference voltage. As the positive reference voltage is connected in series with the diode, during the positive half cycle, even though the diode conducts, the output voltage becomes equal to the reference voltage; hence, the output is clamped towards the positive direction as shown in the above figure.

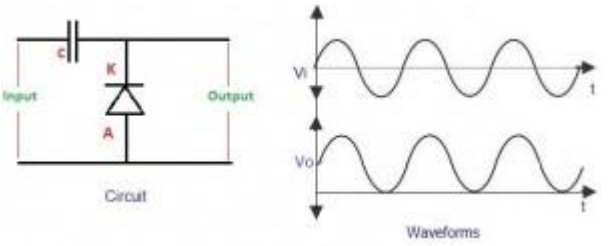
(c) Negative clamper with -ve V_r



By inverting the reference voltage directions, the negative reference voltage is connected in series with the diode as shown in the above figure. During the positive half cycle, the diode starts conduction before zero, as the cathode has a negative reference voltage, which is less than that of zero and the anode voltage, and thus, the waveform is clamped towards the negative direction by the reference voltage value.

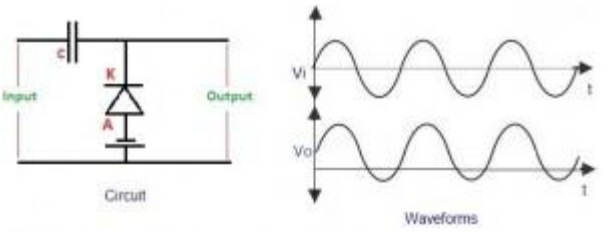
(ii)

(a) Positive clamper



It is almost similar to the negative clamper circuit, but the diode is connected in the opposite direction. During the positive half cycle, the voltage across the output terminals becomes equal to the sum of the input voltage and capacitor voltage (considering the capacitor as initially fully charged). During the negative half cycle of the input, the diode starts conducting and charges the capacitor rapidly to its peak input value. Thus the waveforms are clamped towards the positive direction as shown above.

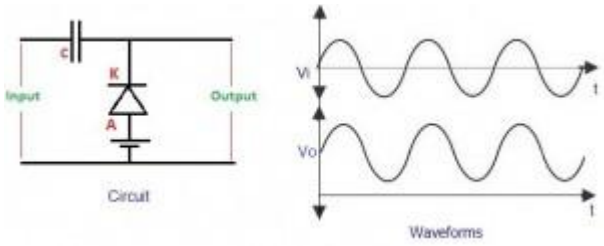
(b) Positive clamper with –ve V_r



The direction of the reference voltage is reversed, which is connected in series with the diode making it as a negative reference voltage. During the positive half cycle the diode will be non conducting, such that the

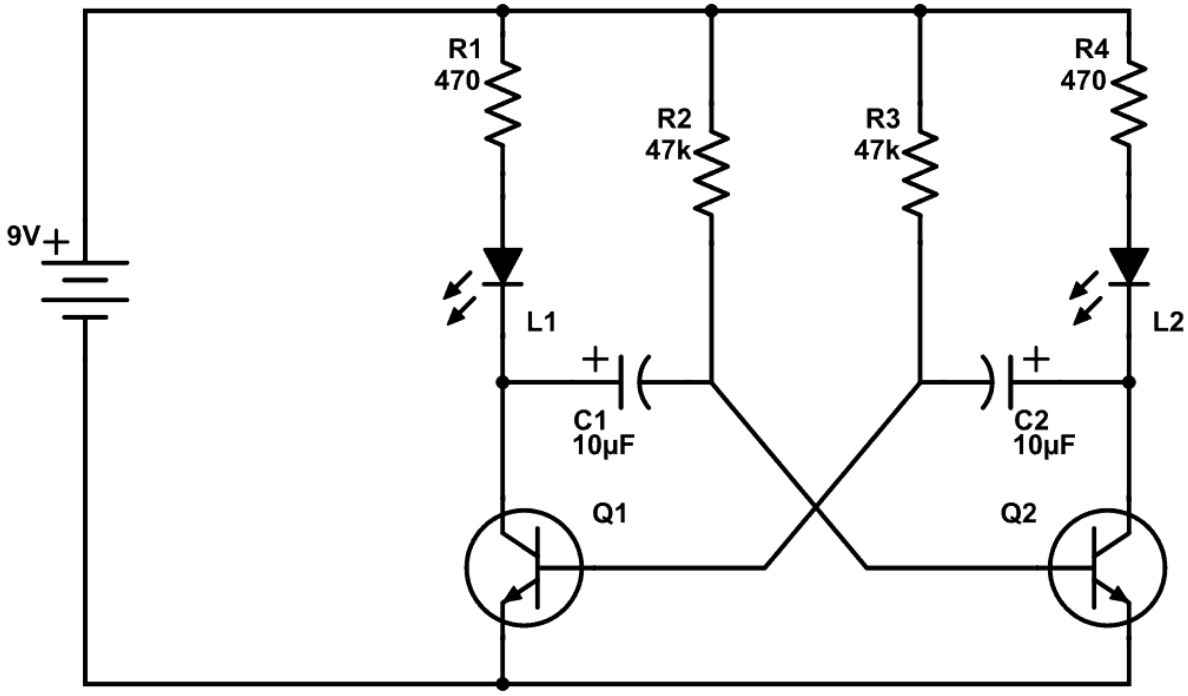
output is equal to capacitor voltage and input voltage. During the negative half cycle, the diode starts conduction only after the cathode voltage value becomes less than the anode voltage. Thus, the output waveforms are generated as shown in the above figure.

(c) Positive clamper with +ve V_r



A positive reference voltage is added in series with the diode of the positive clamper as shown in the circuit. During the positive half cycle of the input, the diode conducts as initially the supply voltage is less than the anode positive reference voltage. If once the cathode voltage is greater than anode voltage then the diode stops conduction. During the negative half cycle, the diode conducts and charges the capacitor. The output is generated as shown in the figure.

3: LED Flasher Circuit-



www.build-electronic-circuits.com

This is a simple flashing **LED** circuit with 2 leds and 2 NPN transistors.
It illustrates the behavior of transistors and capacitors and if you use an oscilloscope it will be very easy to determine what happens in this astable multivibrator circuit. It's state is constantly changing and this change affect the flow of current and voltage and the effect will be visible with the two leds.

Here's the overview of what happens:

The two capacitors C1 and C2 will alternate between being charged and discharged and thereby turning the transistors ON and OFF. When a transistor is ON it allows current to flow through it so that the LED above it will light up.