

Experiment No. 2

CLIPPING AND CLAMPING CIRCUITS

AIM

To realise different clipping and clamping circuits and observe the waveforms.

THEORY

Clipping Circuits

Clipping circuits are nonlinear wave shaping circuits. A clipping circuit is useful to cut off the positive or negative portions of an input waveform. Clipping circuits are also known as voltage limiters or slicers.

Positive clipper

The positive half cycle is clipped by diode and only the drop across diode will appear across the load. During negative half cycle, the diode does not conduct and the voltage across R_L is given by

$$V_L = V_s \frac{R_L}{R_L + R}$$

Since $R_L \gg R$, the output voltage will be close to input voltage during negative half cycle.

Negative clipper

The negative half cycle is clipped by diode and only the drop across diode will appear across the load. During positive half cycle, the diode does not conduct and the voltage across R_L is given by

$$V_L = V_s \frac{R_L}{R_L + R}$$

Since $R_L \gg R$, the output voltage will be close to input voltage during the positive half cycle.

Biased positive clipper

Here a reference voltage is given to the clipper circuit by a zener diode. Up to V_z , the output voltage is

$$V_o = V_{in} R_L / (R_L + R)$$

At $V_o = V_z$, the zener breakdown occurs and the voltage V_o is constant. Here the reference voltage is used to clip only a part of the positive half cycle.

Biased negative clipper

The principle is similar to that of a biased positive clipper. Here a reference voltage is provided by a zener diode to clip a portion of the negative half cycle. During the positive half cycle

$$V_0 = V_{in} R_L / (R_L + R)$$

Slicer

This is the combination of both biased positive clipper and biased negative clipper. The peak portion of the signal determined by the zener voltage reference is clipped.

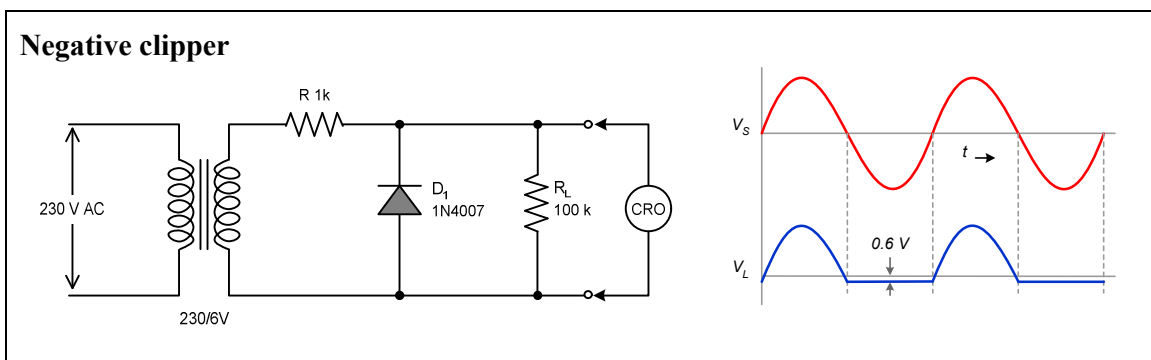
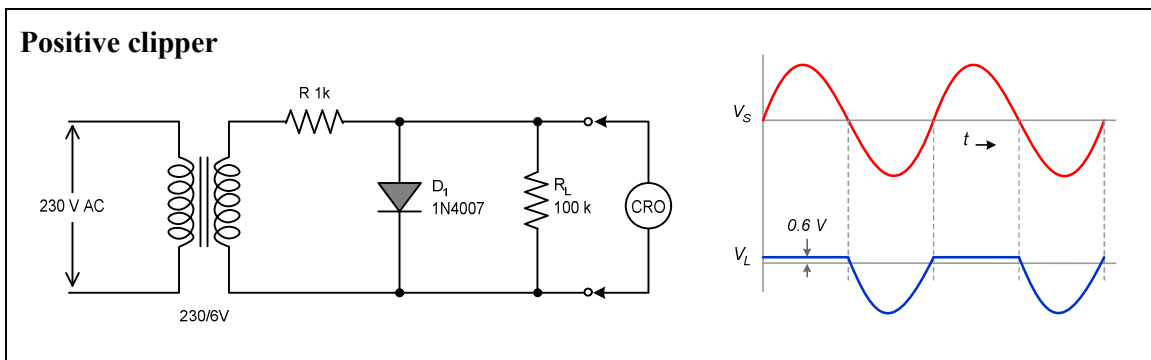
Clamping Circuit

Clamping is a function which must be frequently performed with a periodic waveform in the establishment of the recurrent positive or negative extremity at some constant reference level. Clamping circuits are also referred to as dc restorer or dc inserter.

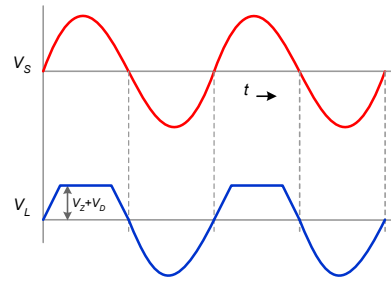
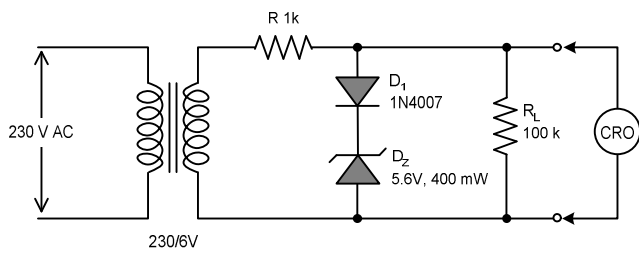
A positive clamper adds positive dc level and a negative clamper adds a negative dc level. A positive clamper clamps a negative extremity of the input signal to the reference voltage level. A negative clamper adds to negative dc level by clamping the positive extremity of the input to the reference voltage level.

PROCEDURE

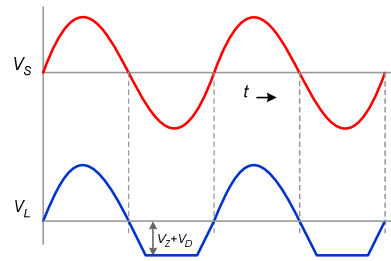
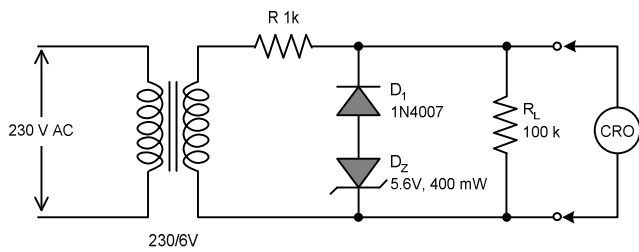
The circuits are wired as in the circuit diagram. Connect the input terminals to 230V ac supply and the output terminals to a CRO.



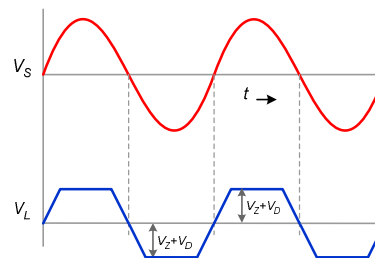
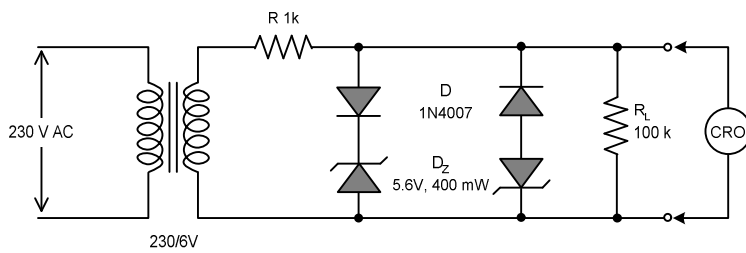
Biased Positive clipper



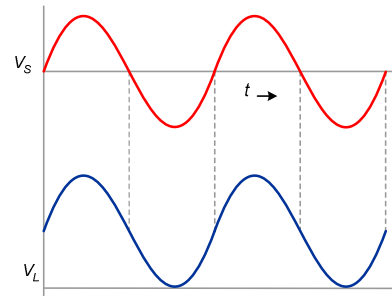
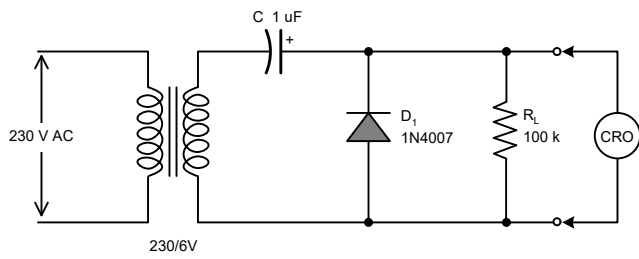
Biased Negative clipper



Slicer



Positive clamping Circuit



Negative clamping Circuit

