

Diode Cliper Circuit

ALWAYS LEARNING

PEARSON

Cliper & Clamper Circuit

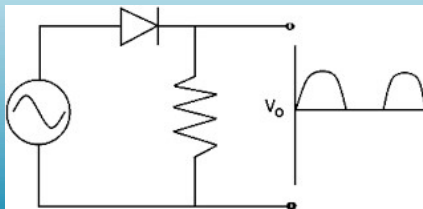
Clipper Circuits are used to clip off a portion of wave from an input signal. Main element is diode and it is used in two ways series and parallel.

Clamper Circuits clampa signal to different dc level. Along with diodes, capacitors and resistors are also used.

Electronic Devices and Circuit Theory
Boylestad© 2013 by Pearson Higher Education, Inc
Upper Saddle River, New Jersey 07458 • All Rights Reserved

Diode Clipping Circuits

- The Diode Clipper, also known as a *Diode Limiter*, is a wave shaping circuit that takes an input waveform and clips or cuts off its top half, bottom half or both halves together to produce an output waveform that resembles a flattened version of the input. For example, the half-wave rectifier is a clipper circuit, since all voltages below zero are eliminated.



Half wave
rectifier

Electronic Devices and Circuit Theory
Boylestad© 2013 by Pearson Higher Education, Inc
Upper Saddle River, New Jersey 07458 • All Rights Reserved

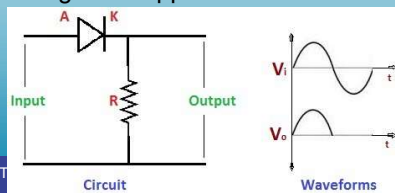
Types of clippers

- Positive Series clippers
- Negative series clippers
- Parallel positive clippers
- Parallel negative clippers
- Clipping of Both Half Cycles
- positive Bias Diode Clipping
- Negative Bias Diode Clipping

Electronic Devices and Circuit Theory
Boylestad© 2013 by Pearson Higher Education, Inc
Upper Saddle River, New Jersey 07458 • All Rights Reserved

1. Series Negative Clipper

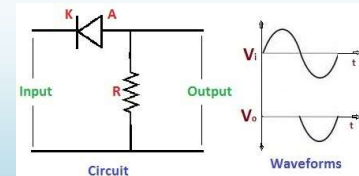
- During the positive half cycle the diode (considered as ideal diode) appears in the forward biased and conducts such that the entire positive half cycle of input appears across the resistor connected in parallel as output waveform.
- During the negative half cycle the diode is in reverse biased. No 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.



Electronic Devices and Circuit Theory
Boylestad

Higher Education, Inc
All Rights Reserved

2. Series Positive Clipper

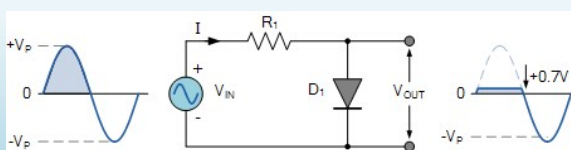


- The series positive clipper circuit is connected as shown in the figure. During the positive half cycle, diode becomes reverse biased, and no output is generated across the resistor, and during the negative half cycle, the diode conducts and the entire input appears as output across the resistor.

Electronic Devices and Circuit Theory
Boylestad

© 2013 by Pearson Higher Education, Inc
Upper Saddle River, New Jersey 07458 • All Rights Reserved

3. Parallel Positive clipper



- In this diode clipping circuit, the diode is forward biased (anode more positive than cathode) during the positive half cycle of the sinusoidal input waveform. For the diode to become forward biased, it must have the input voltage magnitude greater than +0.7 volts (0.3 volts for a germanium diode).

- When this happens the diode begins to conduct and holds the voltage across itself constant at 0.7V until the sinusoidal waveform falls below this value. Thus the output voltage which is taken across the diode can never exceed 0.7 volts during the positive half cycle.

Electronic Devices and Circuit Theory
Boylestad

© 2013 by Pearson Higher Education, Inc
Upper Saddle River, New Jersey 07458 • All Rights Reserved

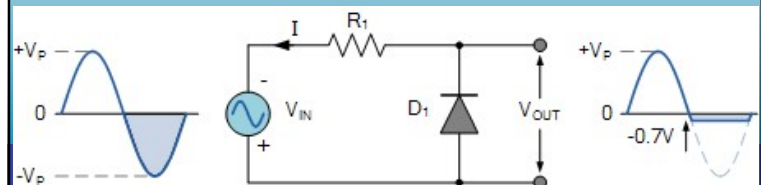
Electronic Devices and Circuit Theory
Boylestad

© 2013 by Pearson Higher Education, Inc
Upper Saddle River, New Jersey 07458 • All Rights Reserved

- During the negative half cycle, the diode is reverse biased (cathode more positive than anode) blocking current flow through itself and as a result has no effect on the negative half of the sinusoidal voltage which passes to the load unaltered. Then the diode limits the positive half of the input waveform and is known as a positive clipper circuit.

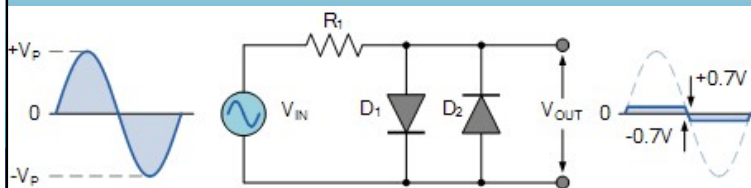
Parallel Negative Clipper

- Here the reverse is true. The diode is forward biased during the negative half cycle of the sinusoidal waveform and limits or clips it to -0.7 volts while allowing the positive half cycle to pass unaltered when reverse biased. As the diode limits the negative half cycle of the input voltage it is therefore called a negative clipper circuit.



Clipping of Both Half Cycles

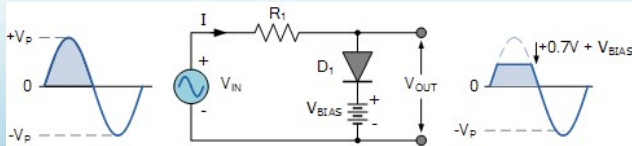
- If we connected two diodes in inverse parallel as shown, then both the positive and negative half cycles would be clipped as diode D_1 clips the positive half cycle of the sinusoidal input waveform while diode D_2 clips the negative half cycle. Then diode clipping circuits can be used to clip the positive half cycle, the negative half cycle or both.



Biased Diode Clipping Circuits

- To produce diode clipping circuits for voltage waveforms at different levels, a bias voltage, V_{BIAS} is added in series with the diode as shown.
- The voltage across the series combination must be greater than $V_{BIAS} + 0.7V$ before the diode becomes sufficiently forward biased to conduct.
- For example, if the V_{BIAS} level is set at 4.0 volts, then the sinusoidal voltage at the diode's anode terminal must be greater than $4.0 + 0.7 = 4.7$ volts for it to become forward biased. Any anode voltage levels above this bias point are clipped off.

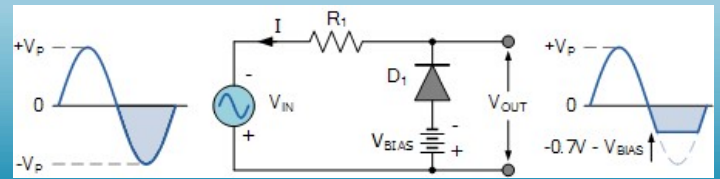
7. Positive Bias Diode Clipping



- Likewise, by reversing the diode and the battery bias voltage, when a diode conducts the negative half cycle of the output waveform is held to a level $-V_{BIAS} - 0.7V$ as shown.

8. Negative Bias Diode Clipping

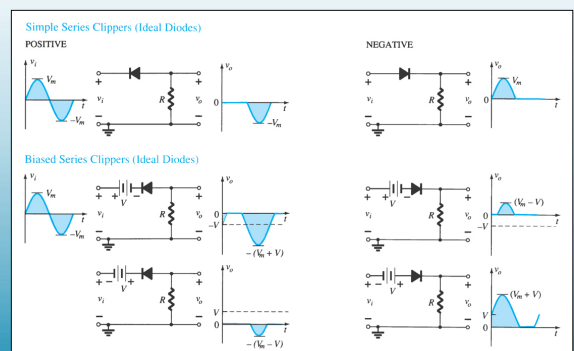
- A variable diode clipping or diode limiting level can be achieved by varying the bias voltage of the diodes. If both the positive and the negative half cycles are to be clipped, then two biased clipping diodes are used. But for both positive and negative diode clipping, the bias voltage need not be the same. The positive bias voltage could be at one level, for example 4 volts, and the negative bias voltage at another, for example 6 volts as shown.



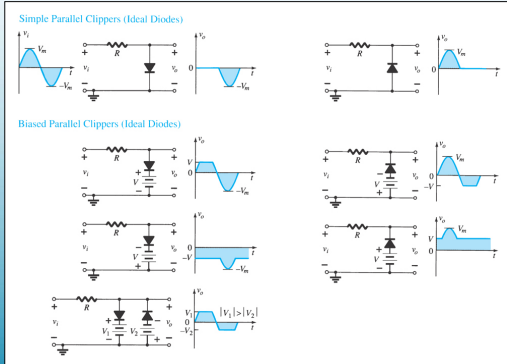
Diode Clipping Summary

- As well as being used as rectifiers, diodes can also be used to clip the top, or bottom, or both of a waveform at a particular dc level and pass it to the output without distortion. In or examples above we have assumed that the waveform is sinusoidal but in theory any shaped input waveform can be used.

Summary of Clipper Circuits



Summary of Clipper Circuits



Summary of Clipper Circuits

