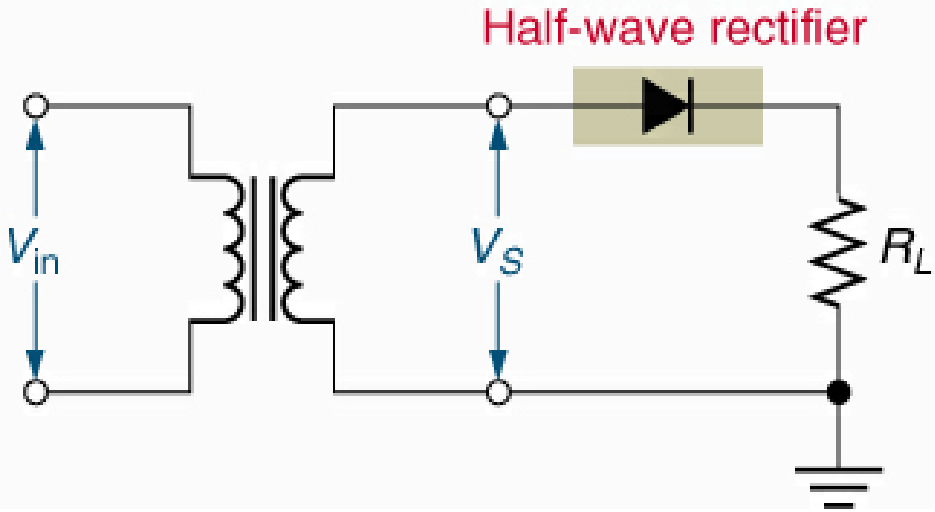
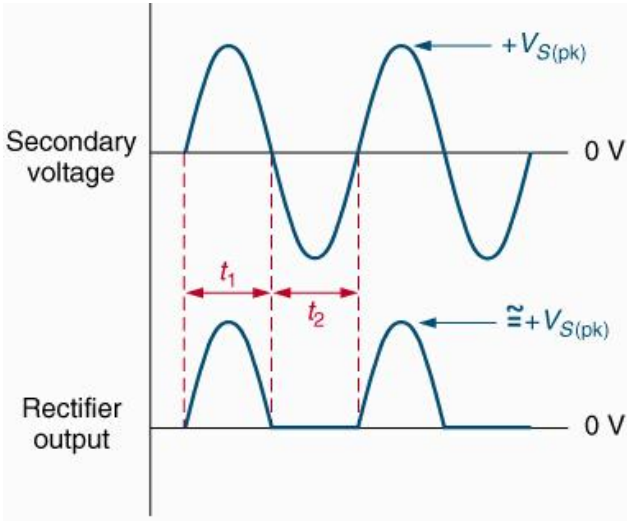
Half-wave Rectifiers

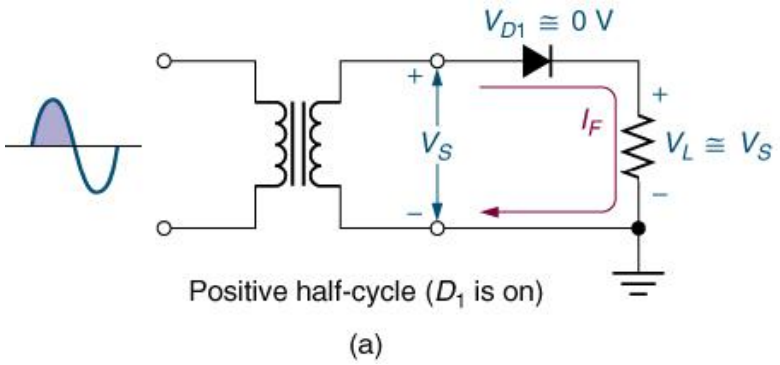
- Half-wave rectifier – A diode placed in series between a transformer (or ac line input) and its load.



Positive Half-wave Rectifiers

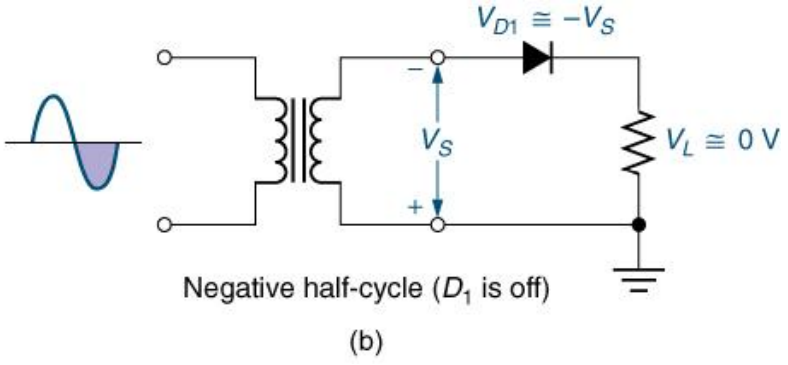
This circuit converts an ac input to a series of positive pulses.





Positive half-cycle (D_1 is on)

(a)



Negative half-cycle (D_1 is off)

(b)

Average Load Voltage and Current

- Average voltage (V_{ave}) – The dc equivalent of a voltage waveform.
- Average current (I_{ave}) – The dc equivalent of a current waveform.

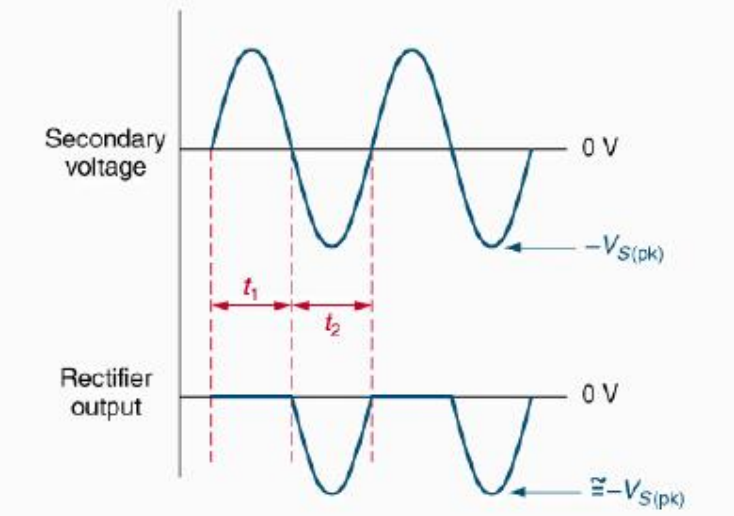
For the output from a *half-wave* rectifier:

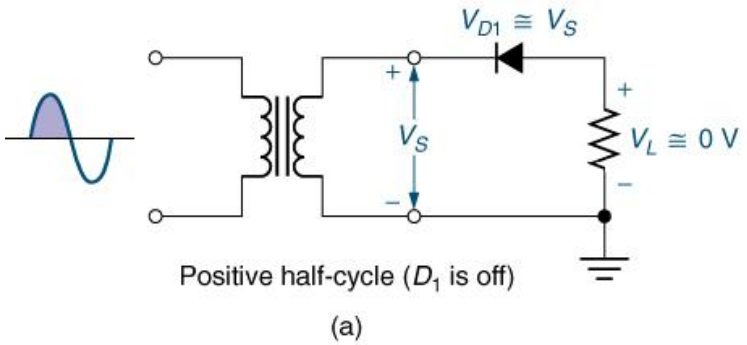
$$V_{ave} = \frac{V_{\text{pk}}}{\pi}$$

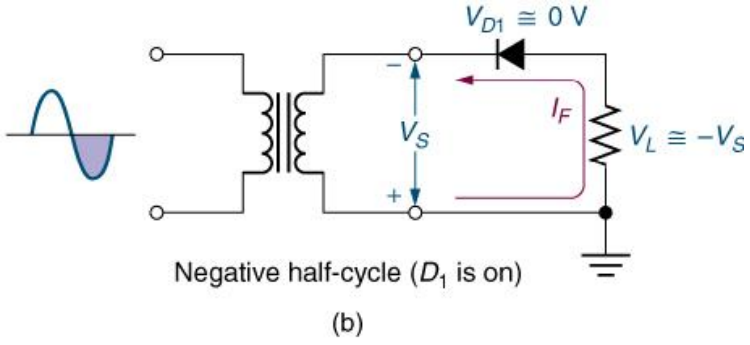
$$I_{ave} = \frac{I_{\text{pk}}}{\pi}$$

Negative Half-wave Rectifiers

This circuit converts an ac input to a series of negative pulses.







Peak Inverse Voltage (PIV)

Peak inverse voltage (PIV) – The maximum diode reverse bias produced by a given circuit.

For the diode in a half-wave rectifier:

$$\text{PIV} = V_{S(\text{pk})}$$