

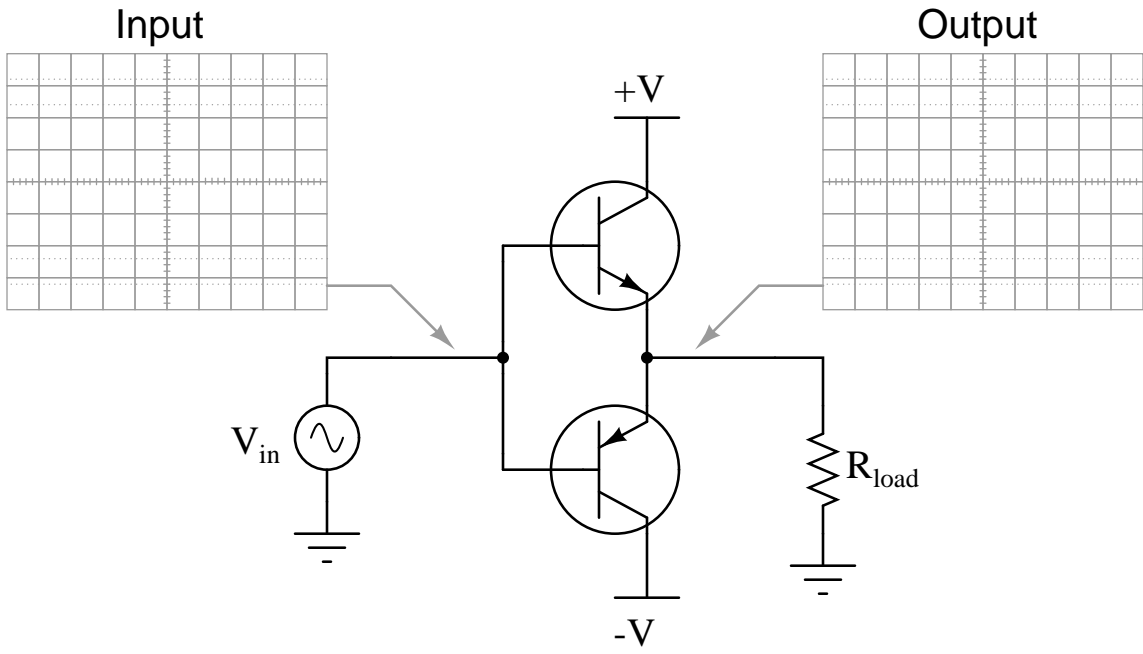
Question 1

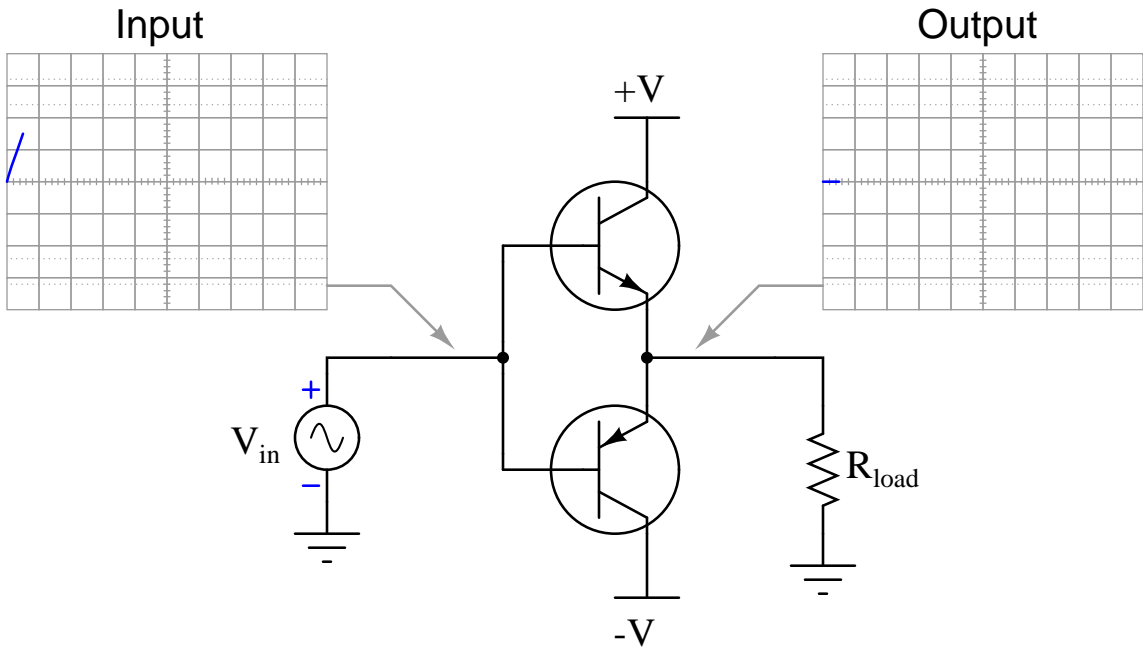
Animation: crossover distortion in a push-pull transistor amplifier

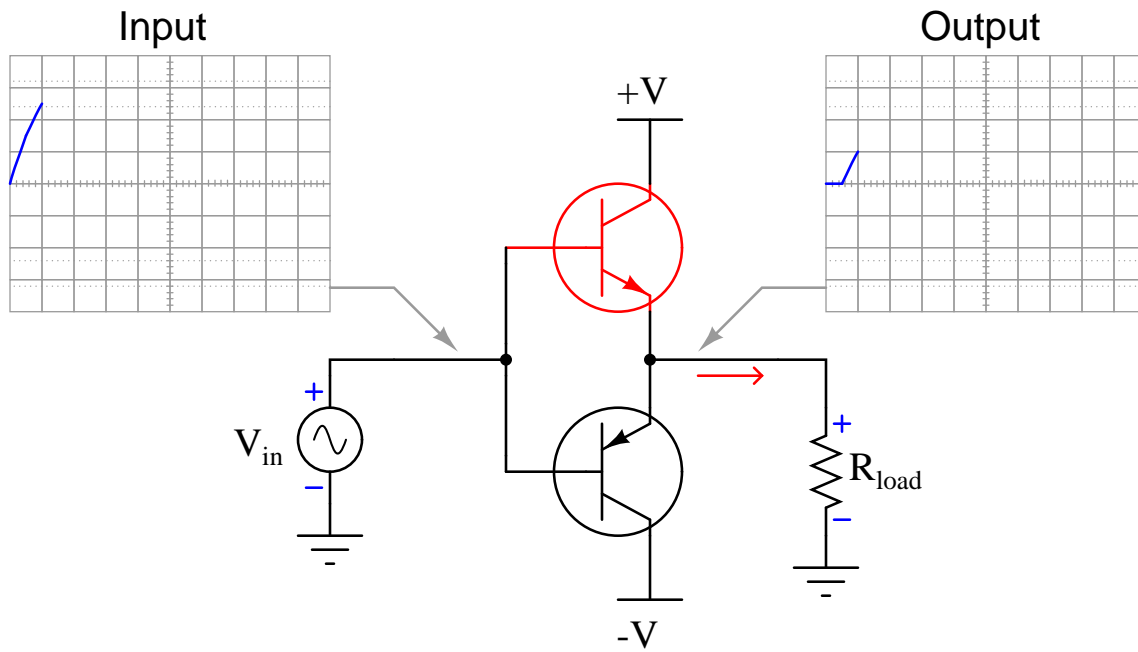
This question consists of a series of images (one per page) that form an animation. Flip the pages with your fingers to view this animation (or click on the "next" button on your viewer) frame-by-frame.

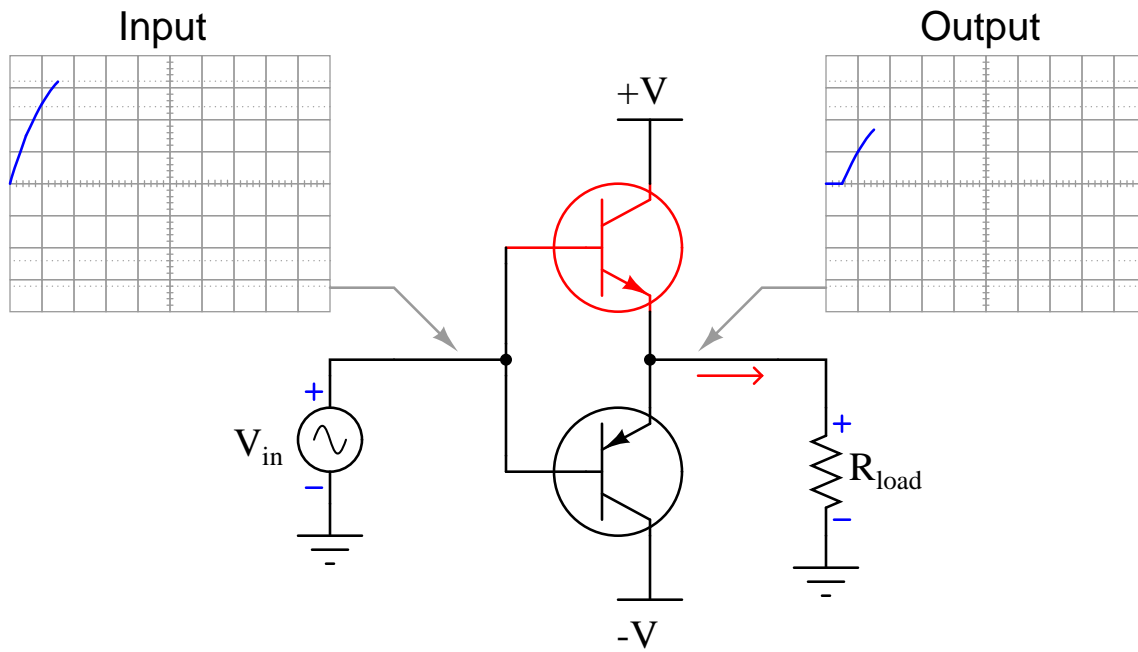
The following animation shows a simple push-pull, emitter-follower amplifier circuit exhibiting crossover distortion. Watch what happens as the input voltage goes through a whole cycle, noting when each transistor begins to conduct, and when each transistor ceases conduction. Here are some things to look for:

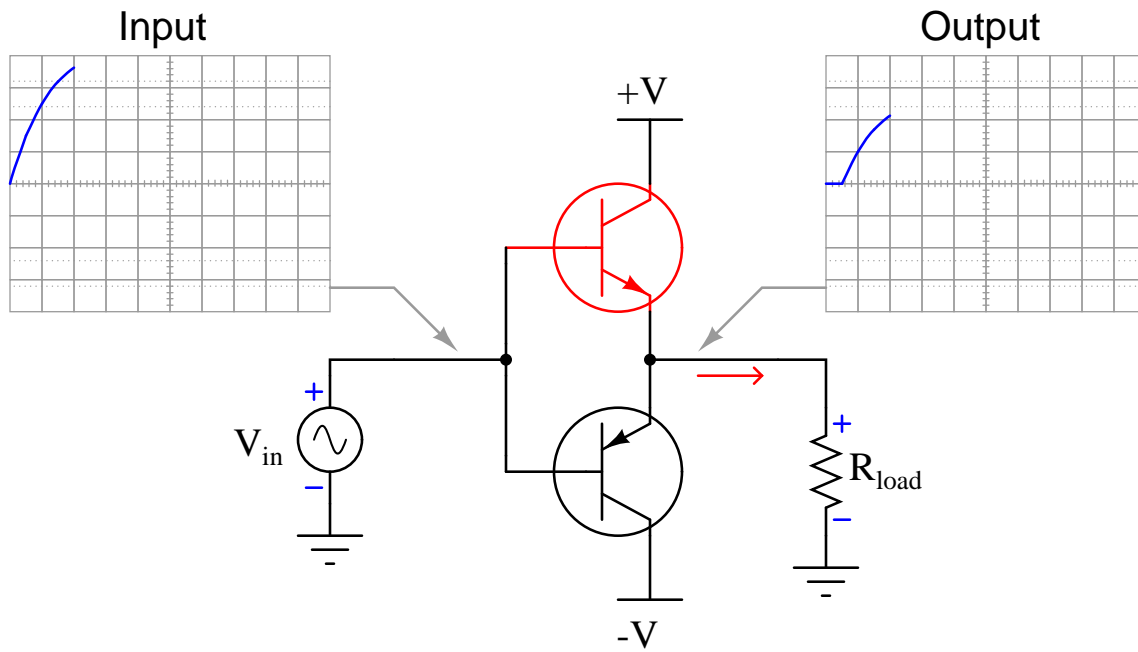
- Which transistor handles which portion of the input waveform (positive versus negative)?
- Why is there a "flat" spot in the output waveform?
- What would have to be done to this circuit to allow it to reproduce the waveform in full?

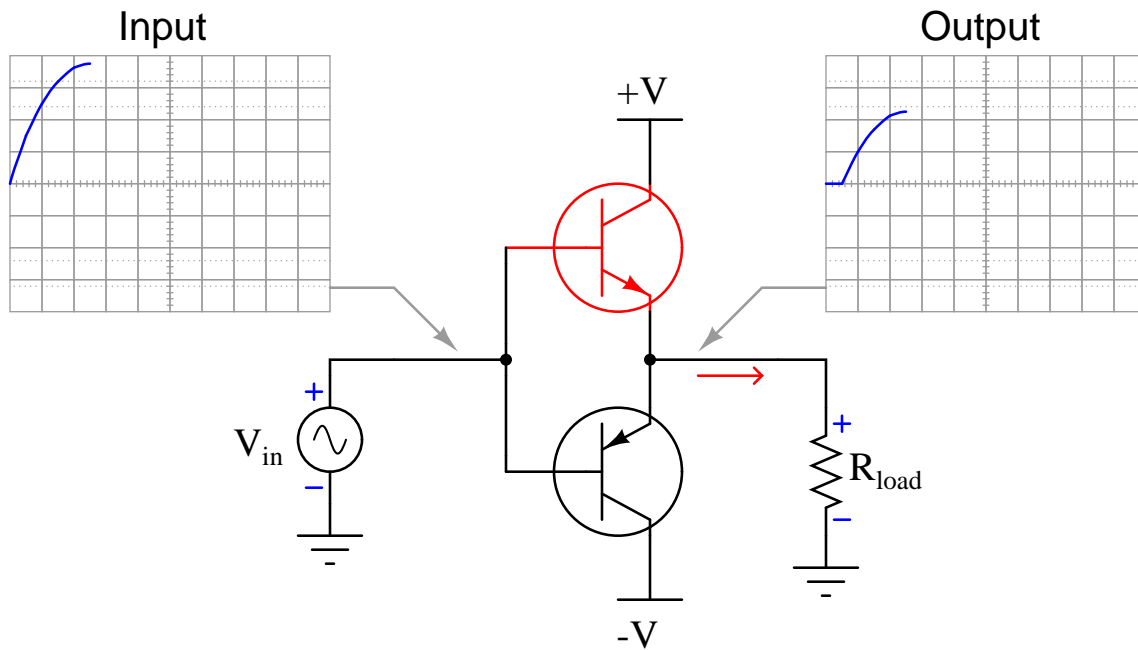


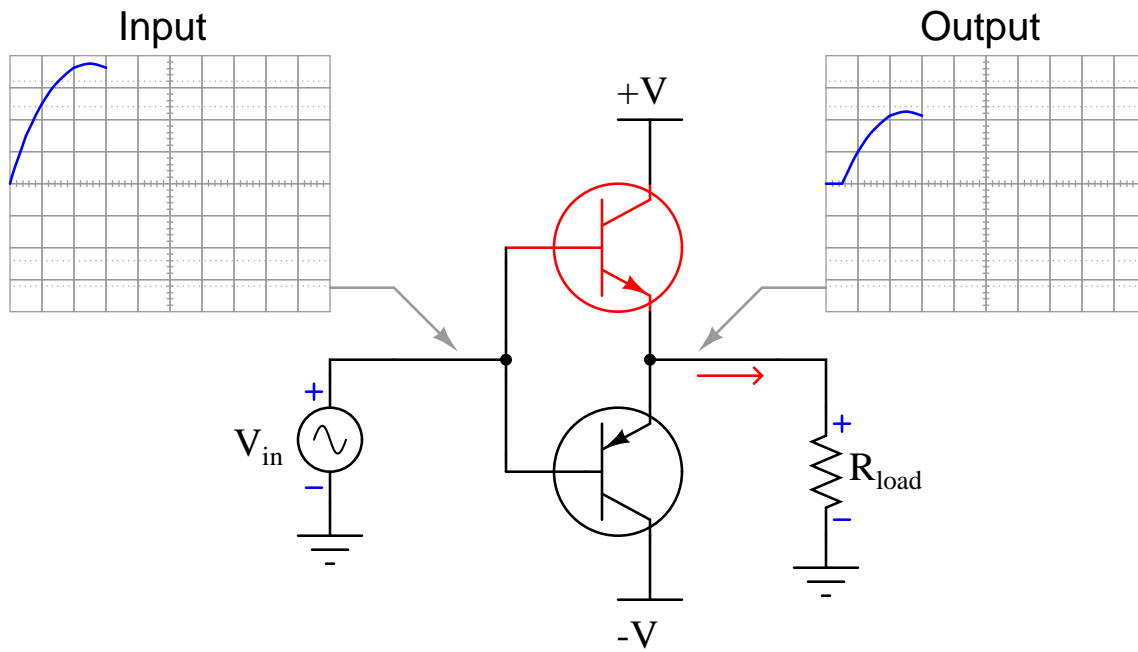


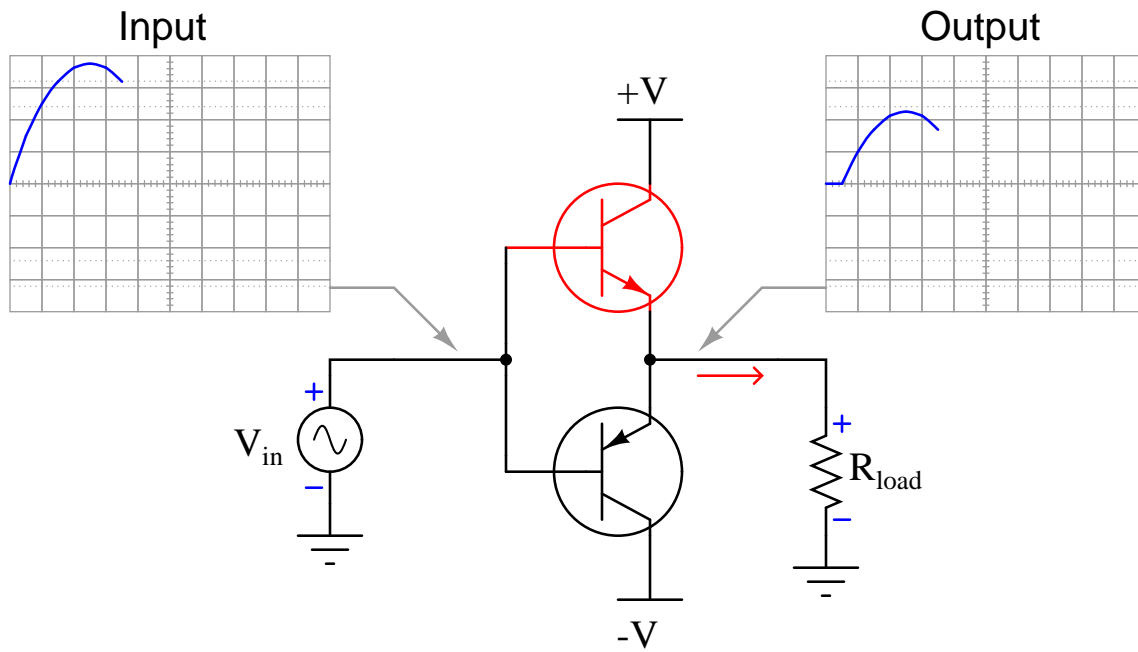


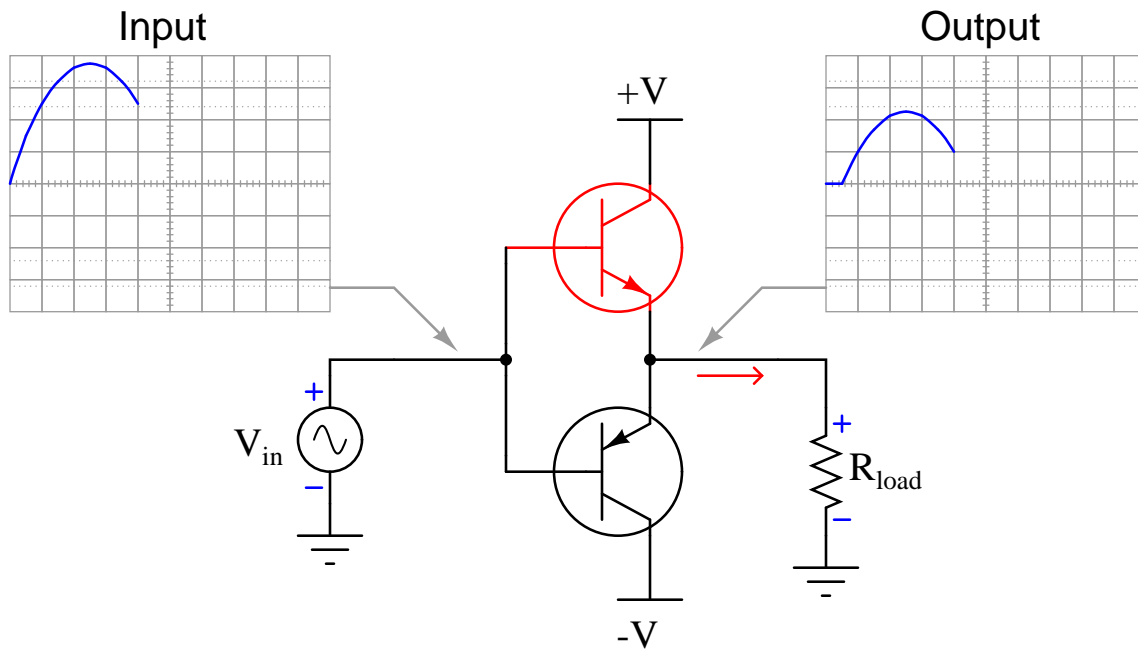


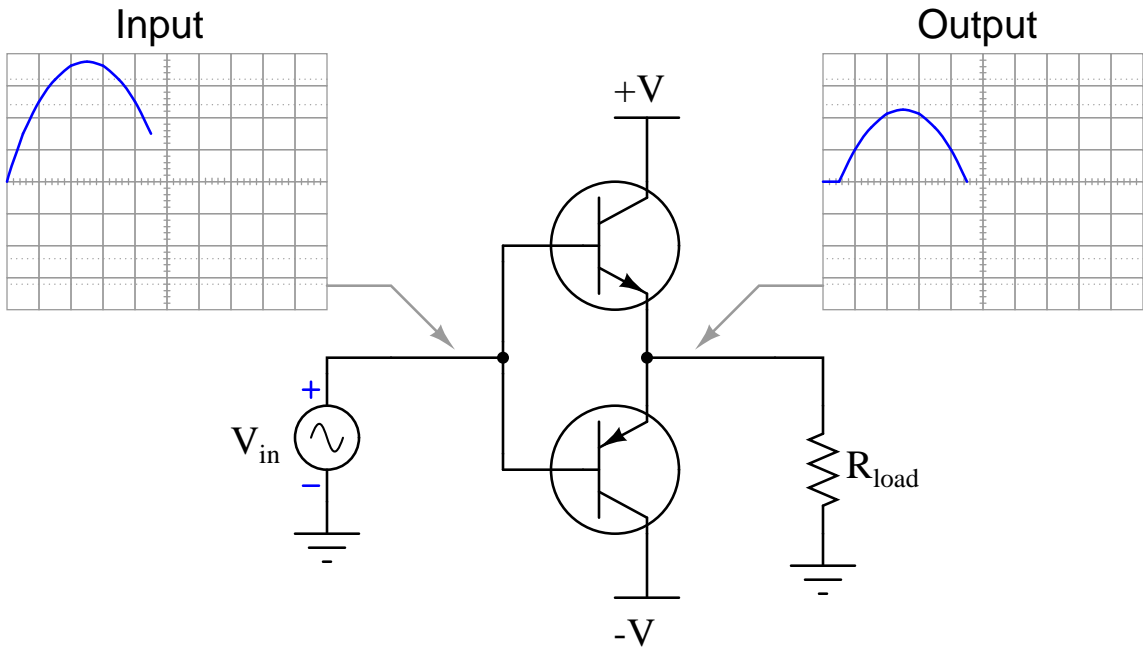


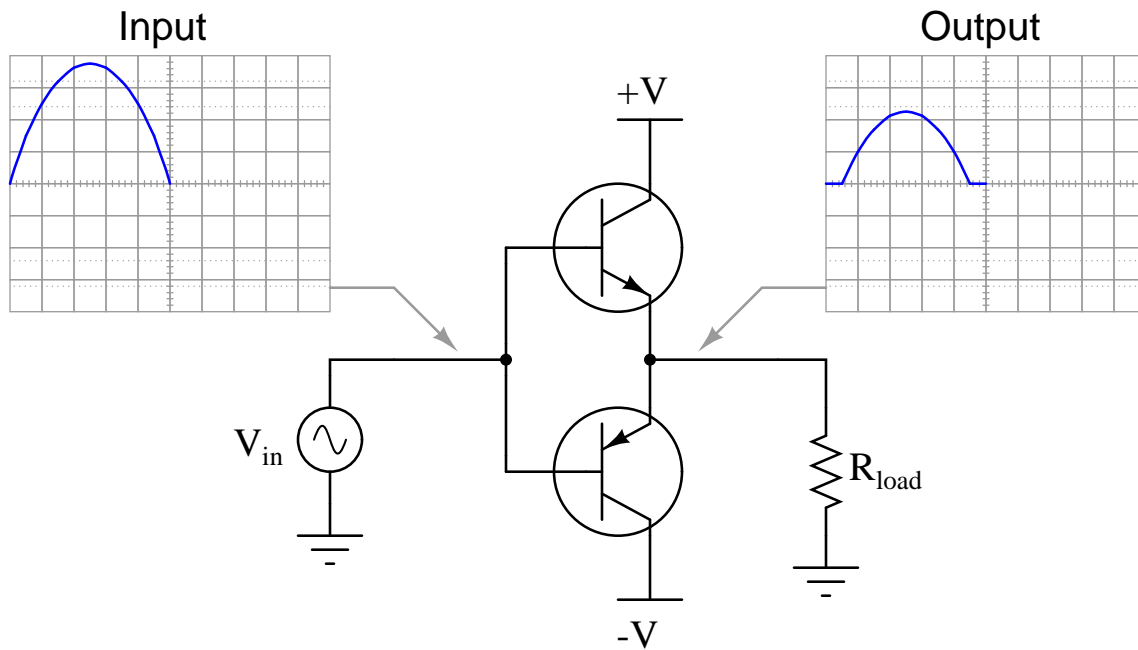


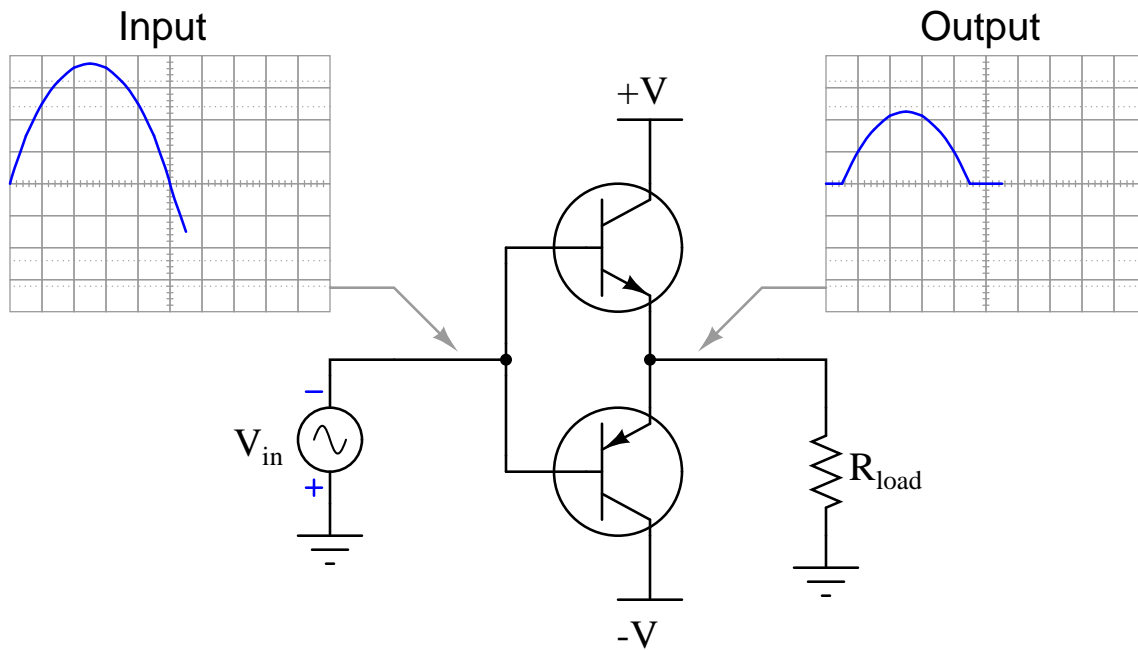


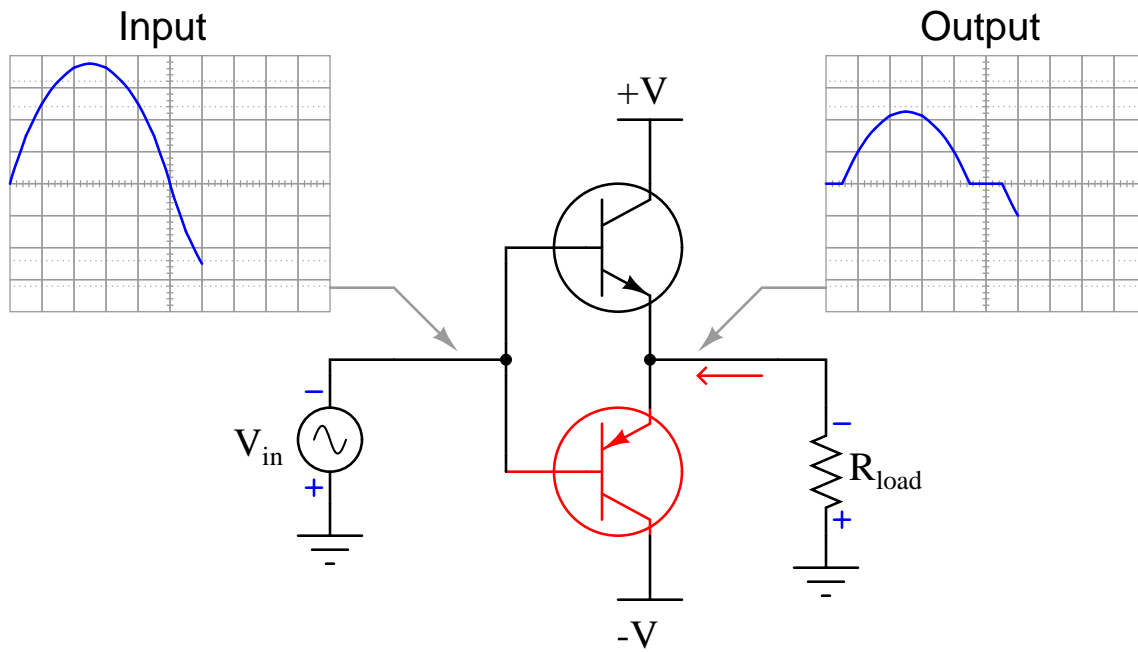


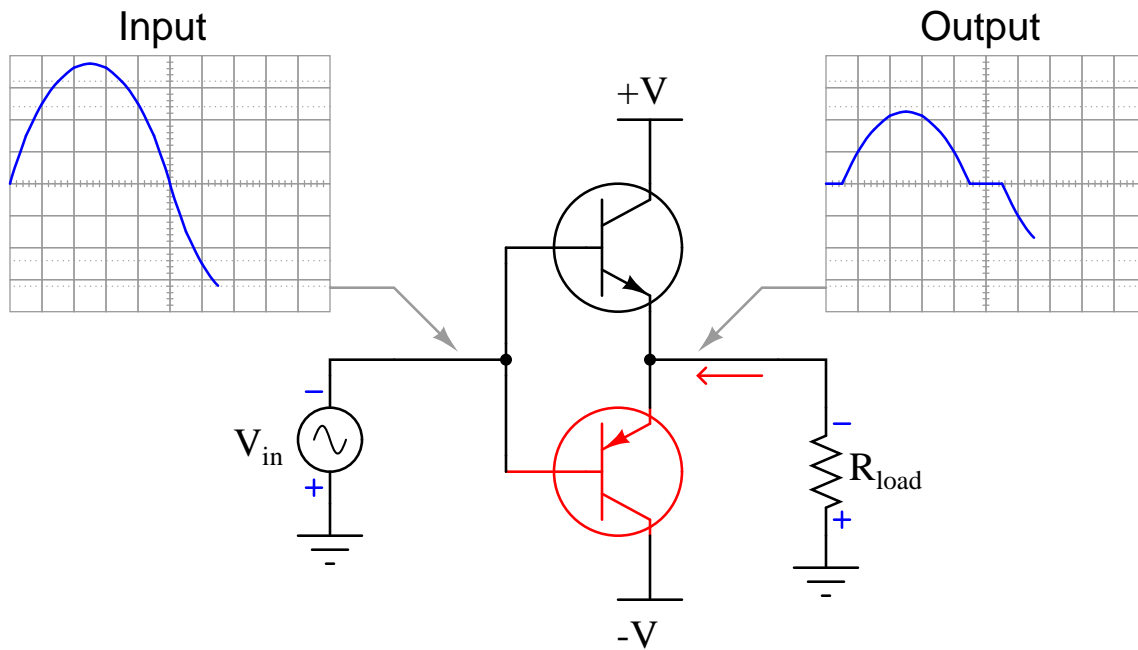


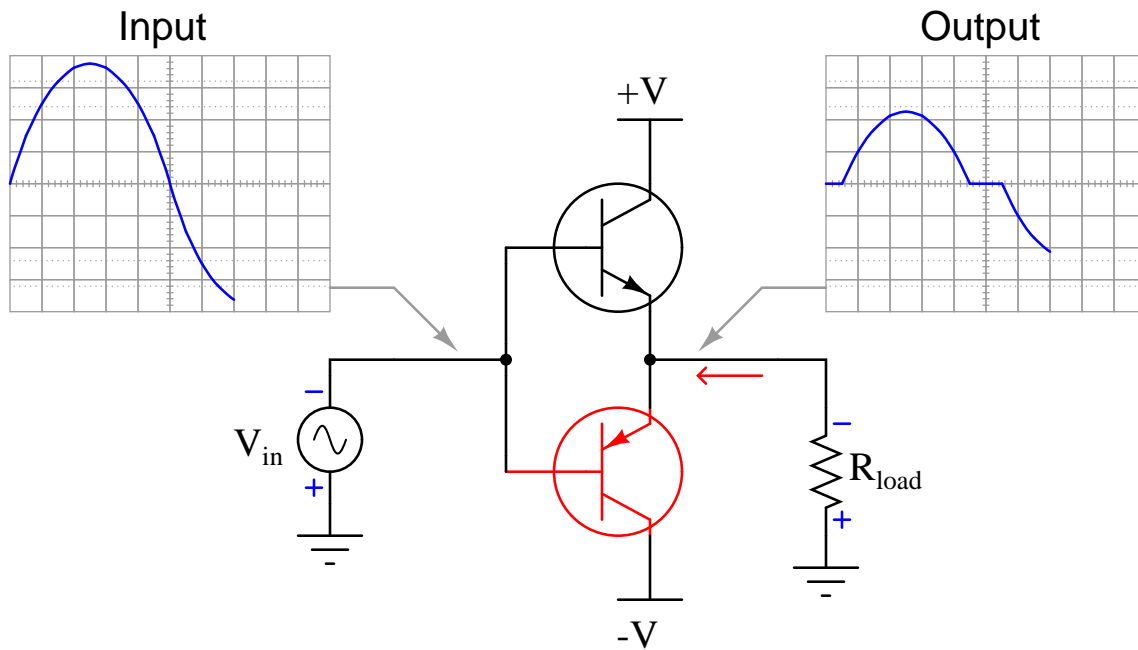


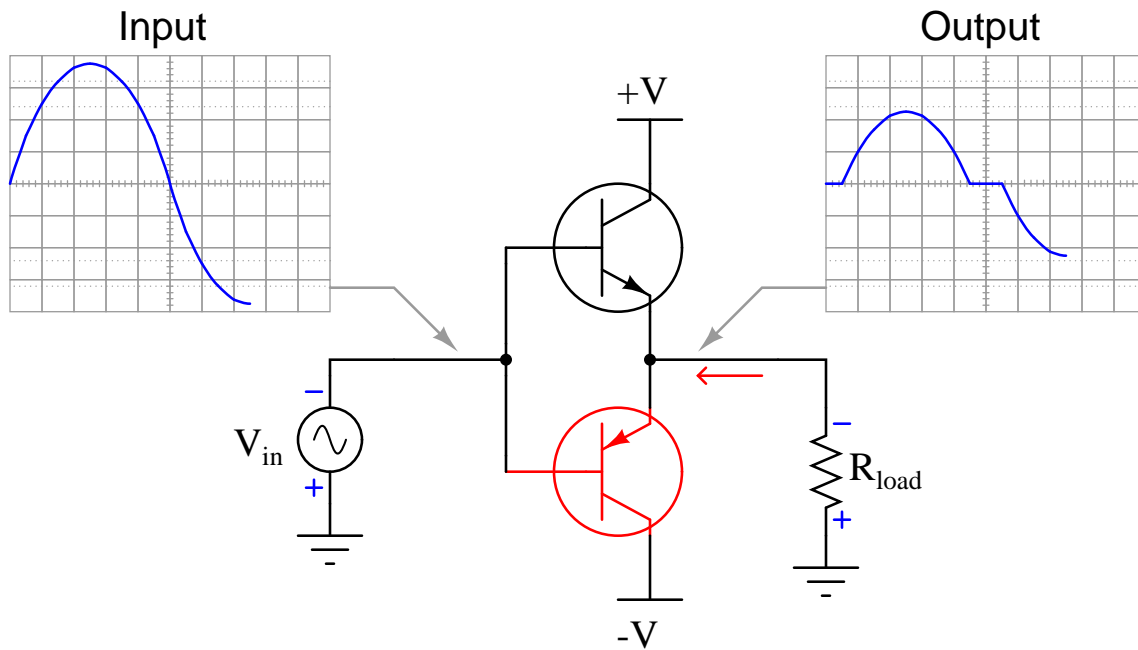


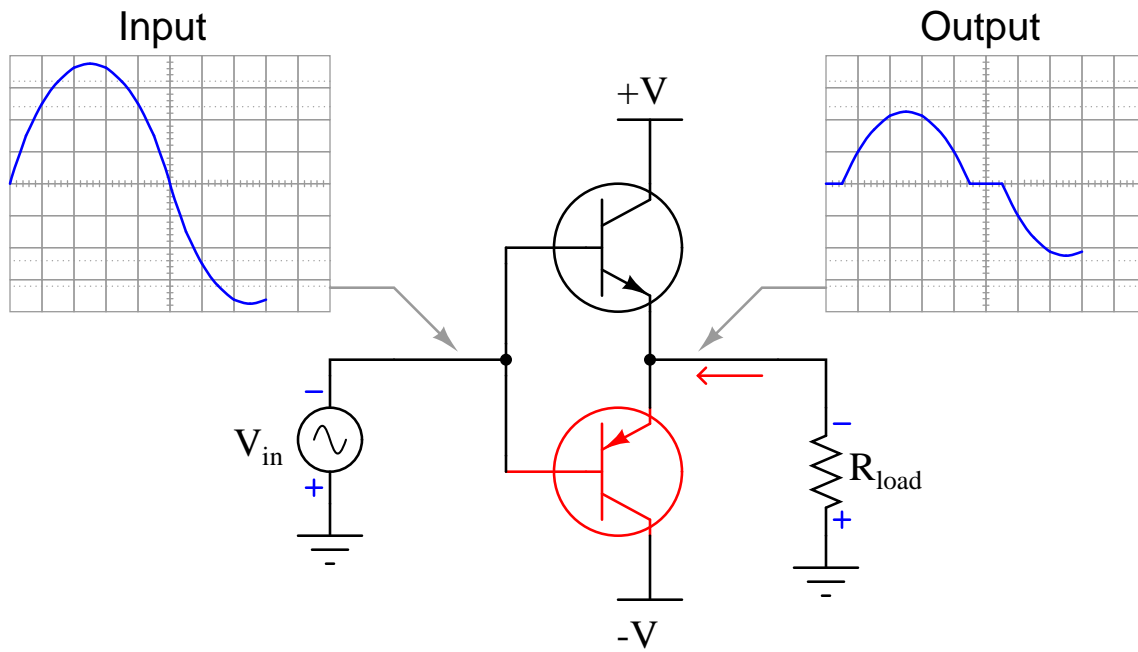


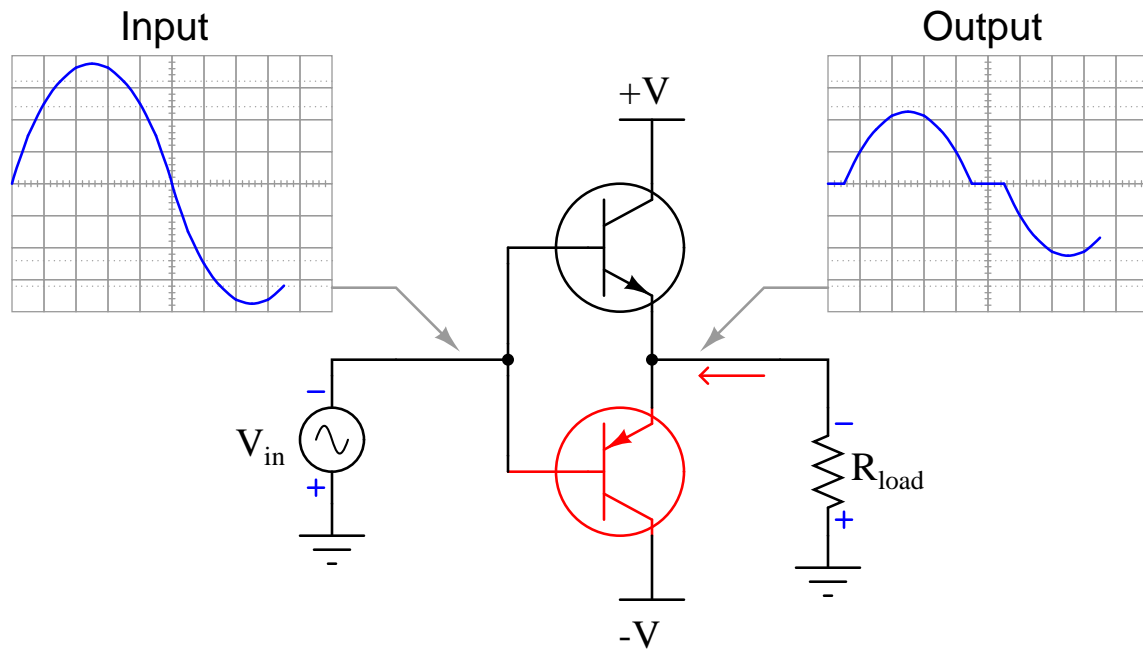


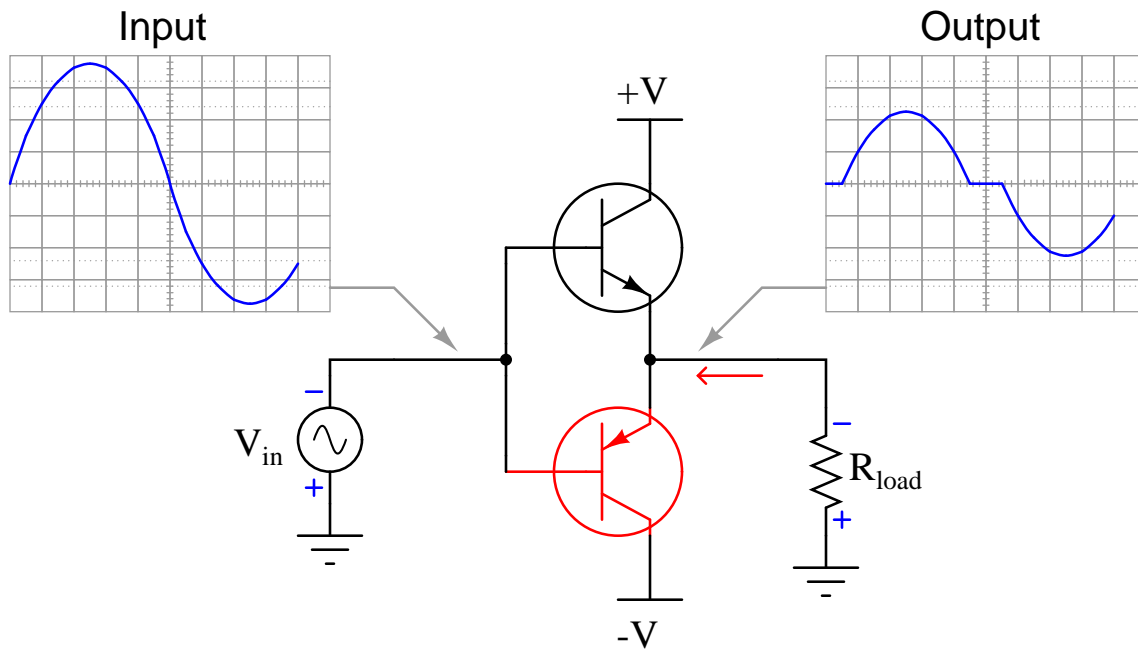


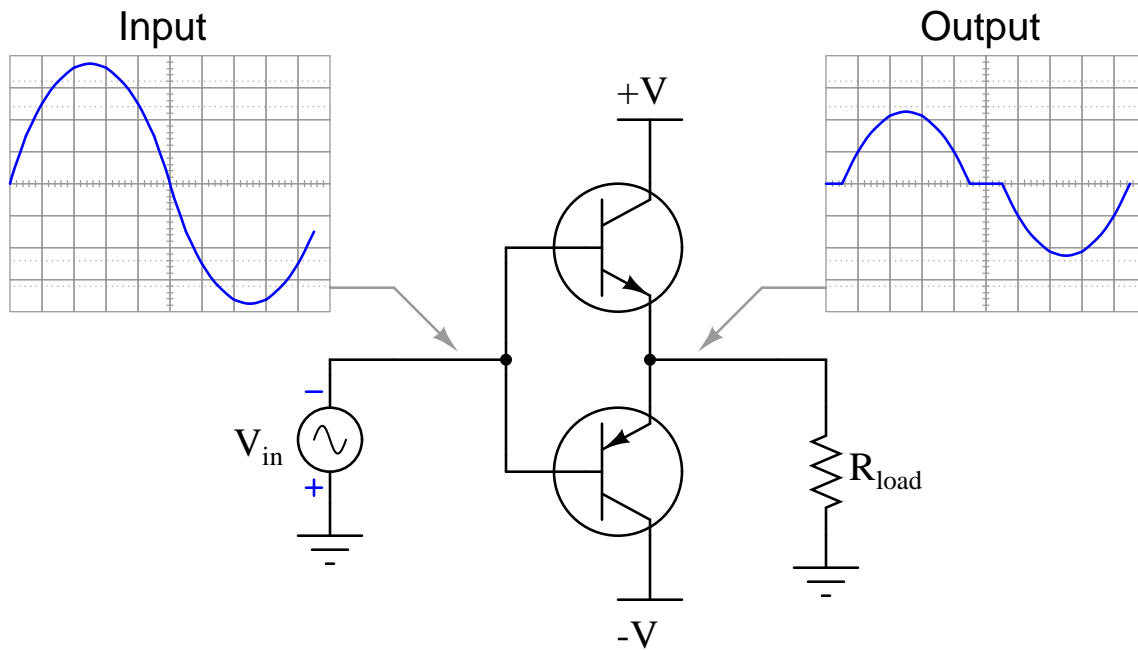


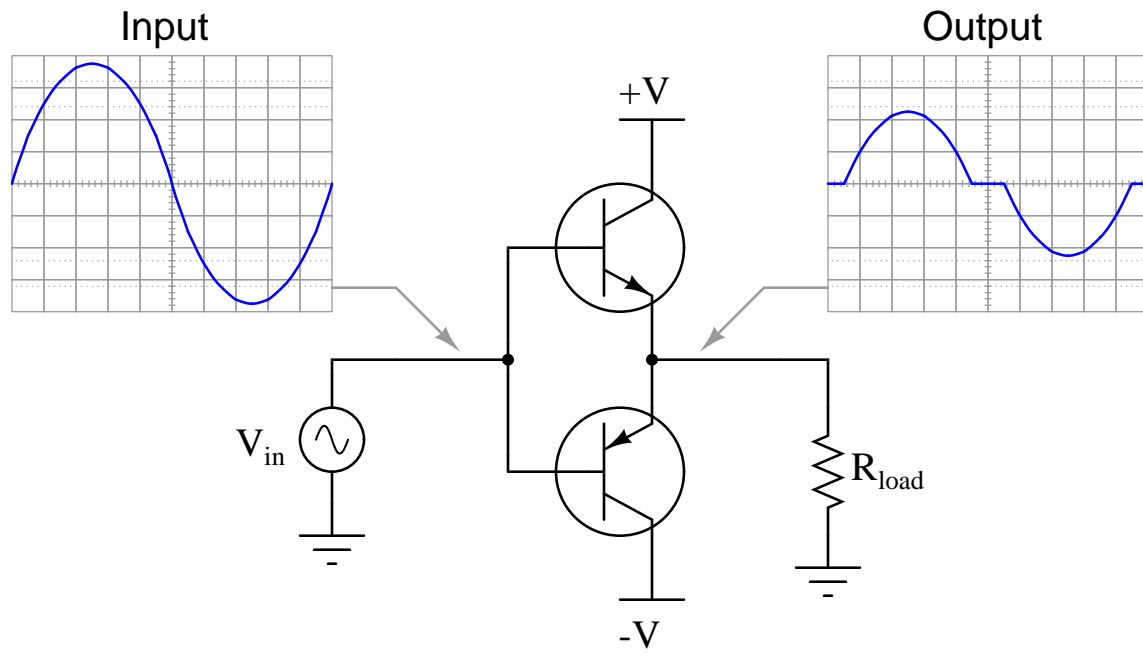












file 03233

Answer 1

For silicon transistors, the crossover distortion amounts to approximately 1.4 volts (from +0.7 to -0.7 volts) in the input waveform.

Follow-up question: in terms of percentage, do you think crossover distortion increases as the input signal increases in peak-to-peak magnitude, or decreases? Explain your reasoning.

Notes 1

The purpose of this animation is to let students study the behavior of this amplifier circuit and reach their own conclusions. Similar to experimentation in the lab, except that here all the data collection is done visually rather than through the use of test equipment, and the students are able to "see" things that are invisible in real life.