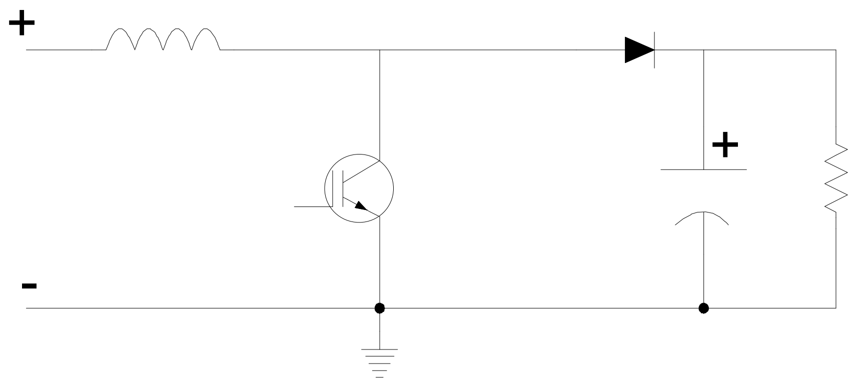
Boost Circuit

This part is just showing the general idea of a boost circuit. Energy is stored in an inductor and then released. By adjusting the switching times you can adjust the amount of energy stored.



The above diagram show a standard boost circuit. The IGBT is fired using PWM principals.

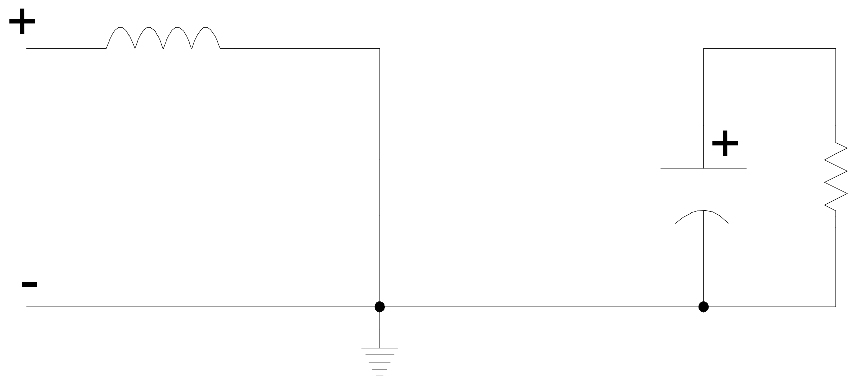


Diagram shows the circuit configuration when the IGBT has turned on. Current flow is through the inductor to earth. The diode is turned off and so is out of circuit. The DC voltage is maintained by the electrolytic capacitor.

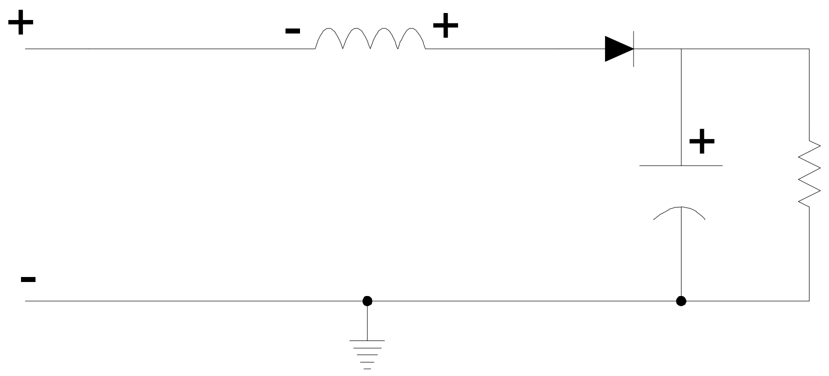
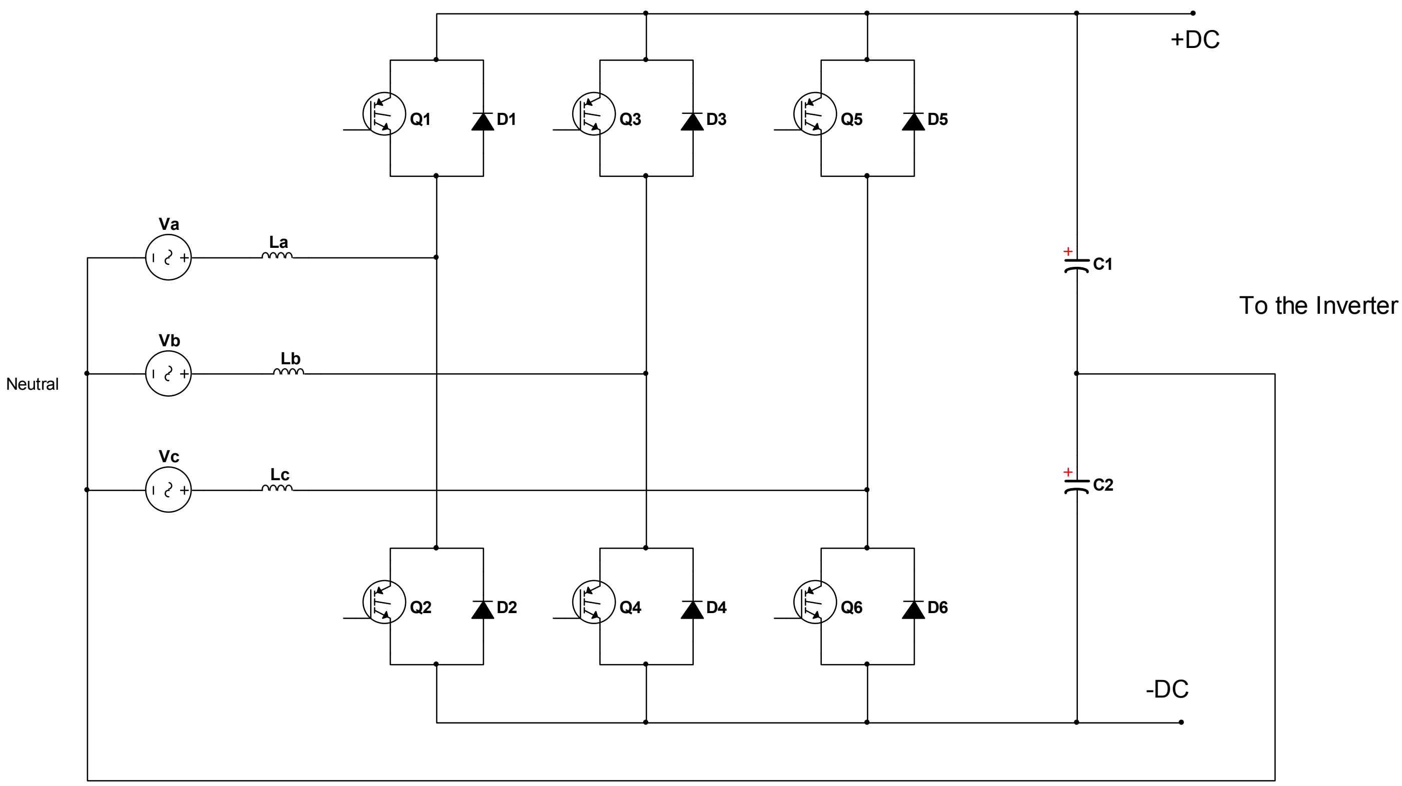
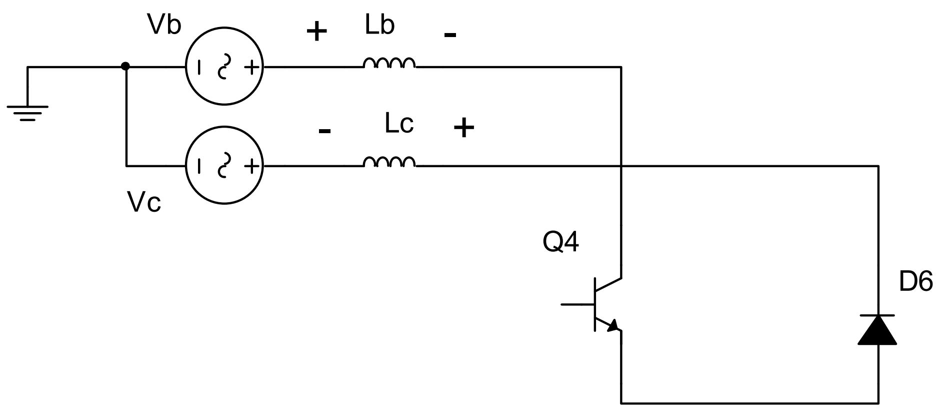


Diagram showing the state of the circuit when the IGBT has switched off. The DC from the rectifier is allowed to flow through to the load. This is added to by the inductor which reverses its voltage and adds to the rectifier voltage. This results in a higher DC level.

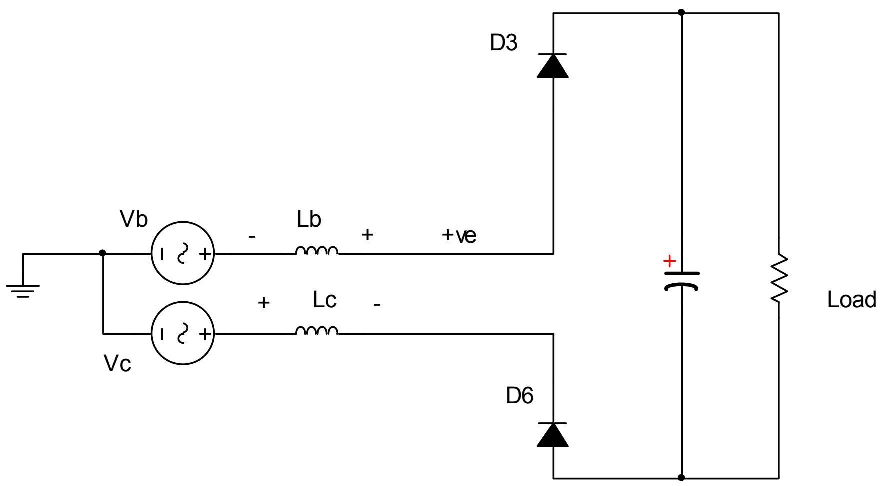


The basic circuit of an IGBT active rectifier. The inductors La, Lb and Lc are the boost inductors.

This is going to be a fairly simple – hand waving explanation. Looking at the above diagram it can be seen that if the DC voltage is not higher than the peak Line – Line voltage of the upstream voltage, then the rectifier would operate as a standard 6 pulse rectifier, with the diodes turning on and the IGBTs not doing much. If the DC voltage is higher than the Line – Line voltage, then the diodes are reversed biased. It works just like a boost circuit, energy is stored and released in the inductors.



The firing – stage 1. Vb – Vc is positive. The IGBT Q4 is turned on. Current flows from Vb, through Lb, Q4, D6 (which is forward biased), Lc and back to Vc. As this current is flowing a voltage is being built up across the inductors opposing the current – Lenz's law. So in stage 1 of the firing energy is being stored in the inductors.



Stage 2. The IGBT Q4 has turned off. The energy in Lb and Lc then transfers via D3 and D6 to the DC link.