

Comparing Half-wave and Full-wave Multi-voltage Rectifiers.

Giorgio Fontana, IN3IEX July 2011

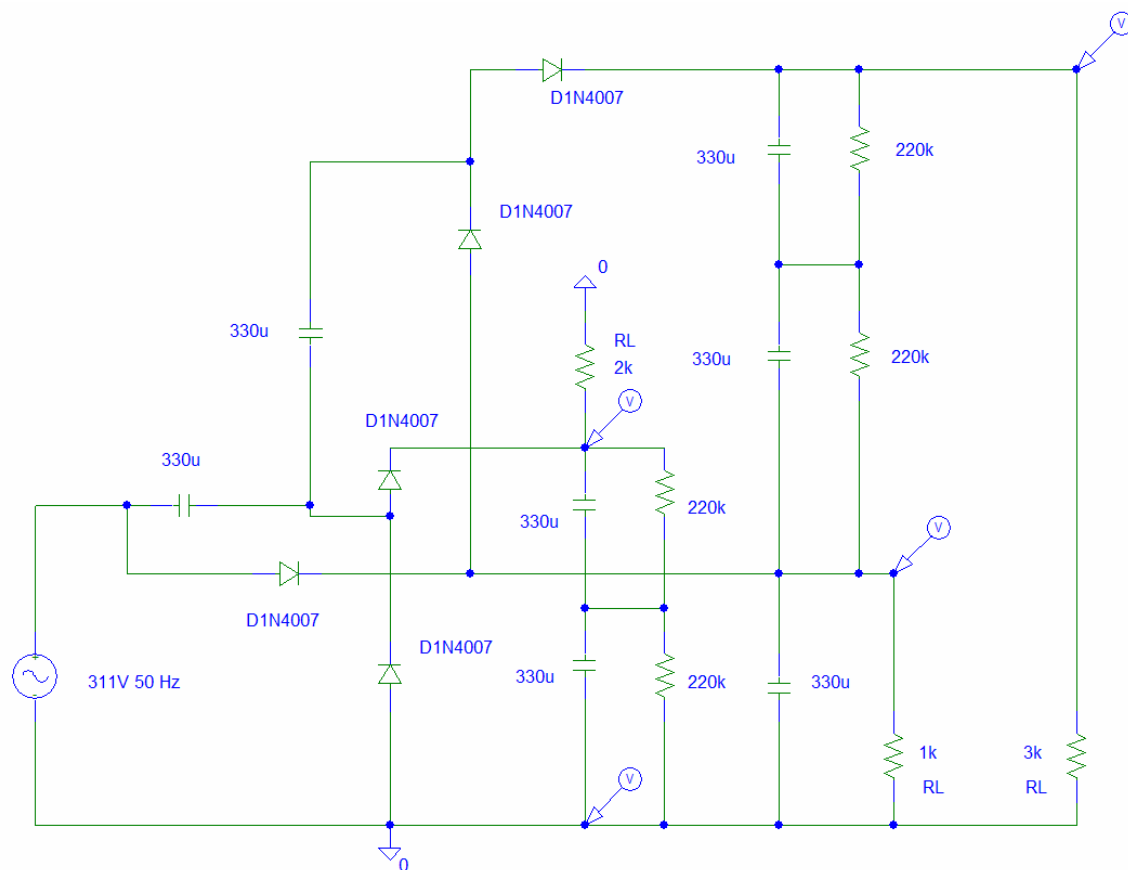
Multi-voltage rectifiers/multipliers are common circuits employed in a large number of power supplies. It is believed that the various circuits are almost equivalent regarding the voltage drop as function of the total capacitance and the load current.

I want to show that this is not true. There is a preferred circuit, and this circuit is almost unknown to most designers.

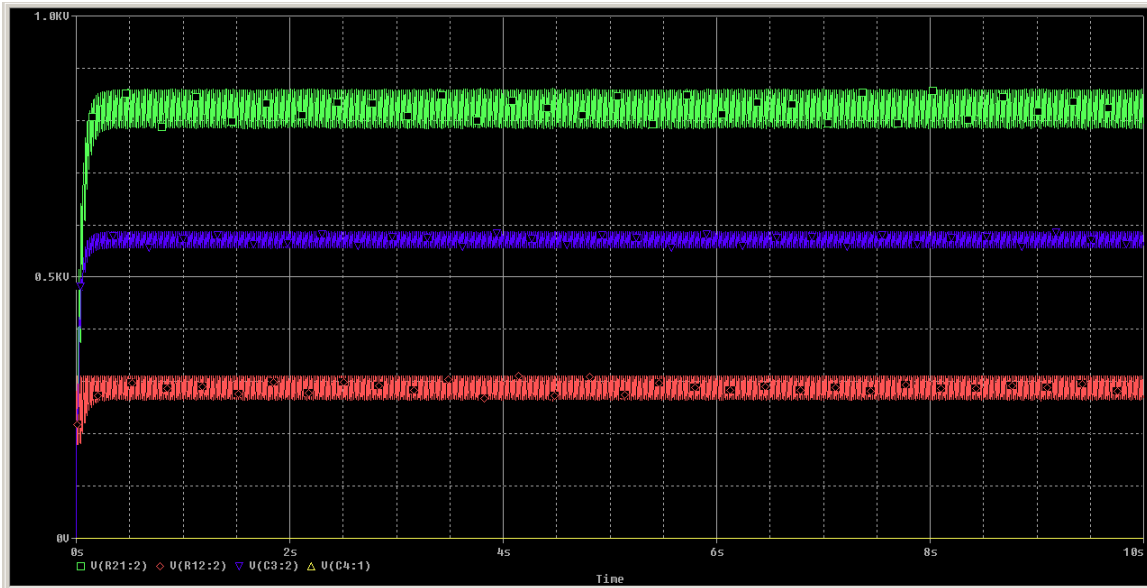
Because accurate analytical study of non-linear circuits is nearly impossible, I present a couple of SPICE simulations.

All capacitor are 330 uF and are “all” charged to the peak voltage of the input sine voltage ($220 * \sqrt{2}$ for a 220 VAC). Both examples are a combination of a rectifier, a duobler and a tripler. As expected, no load voltages are the theoretical ones, therefore the simulation shows only the results of Multi-voltage rectifiers loaded by resistors as shown in the schematics.

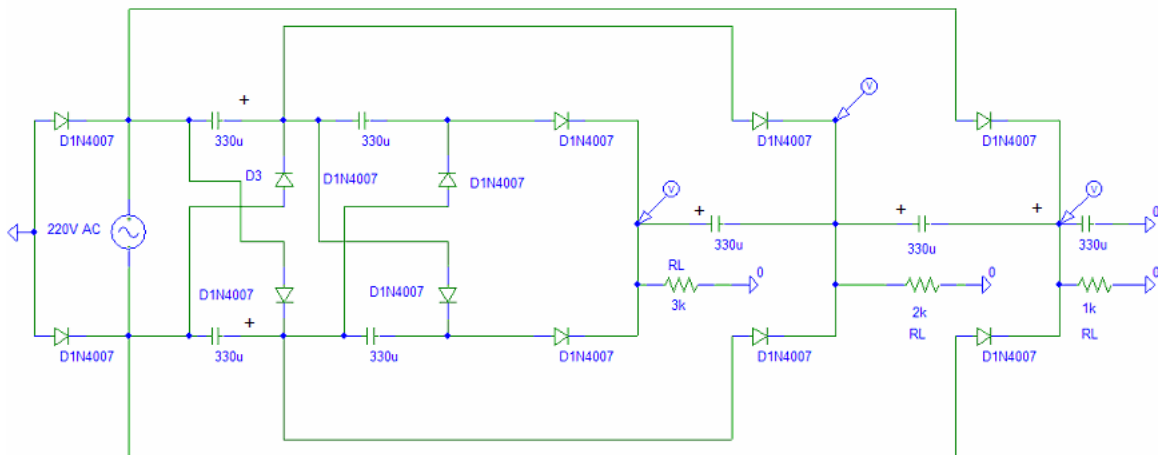
The usual half wave, multi-voltage multiplier is:



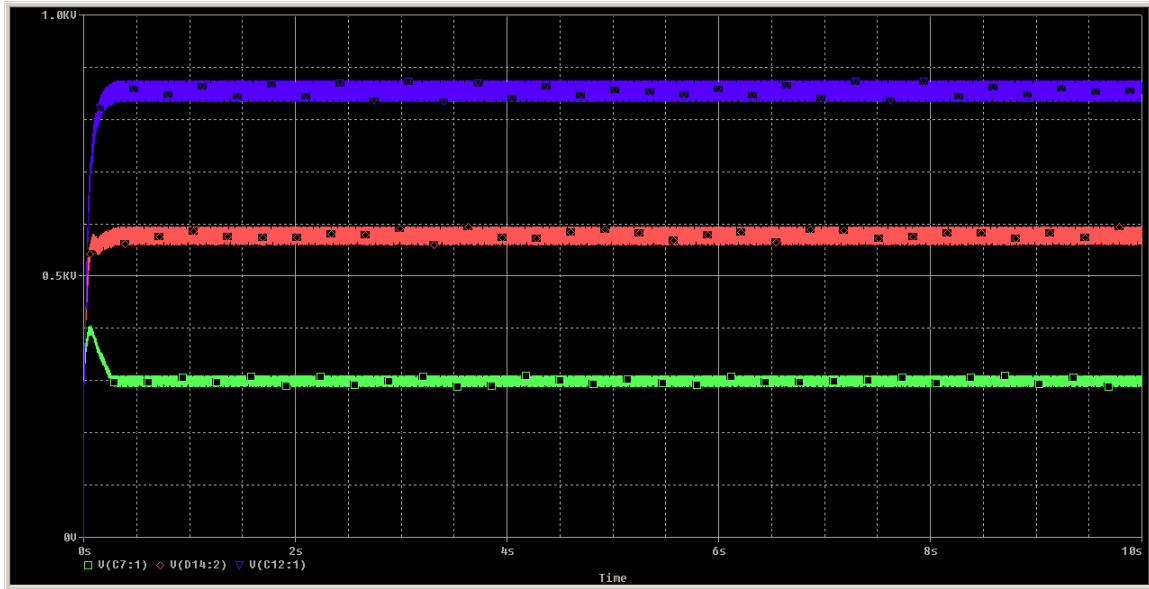
With loaded voltages:



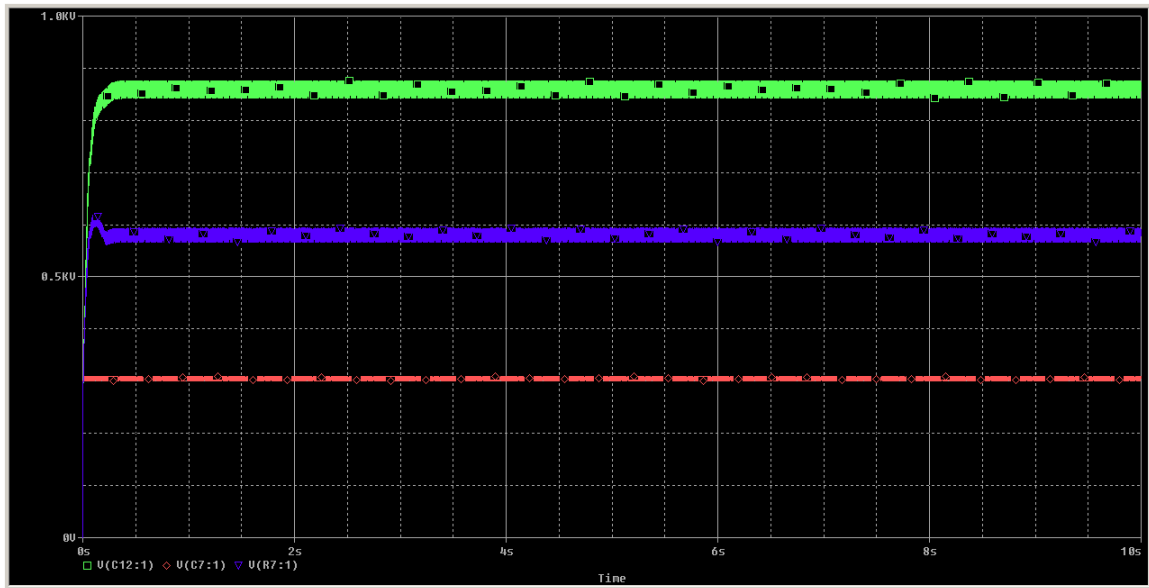
The full wave design is:



That provides the loaded voltages:

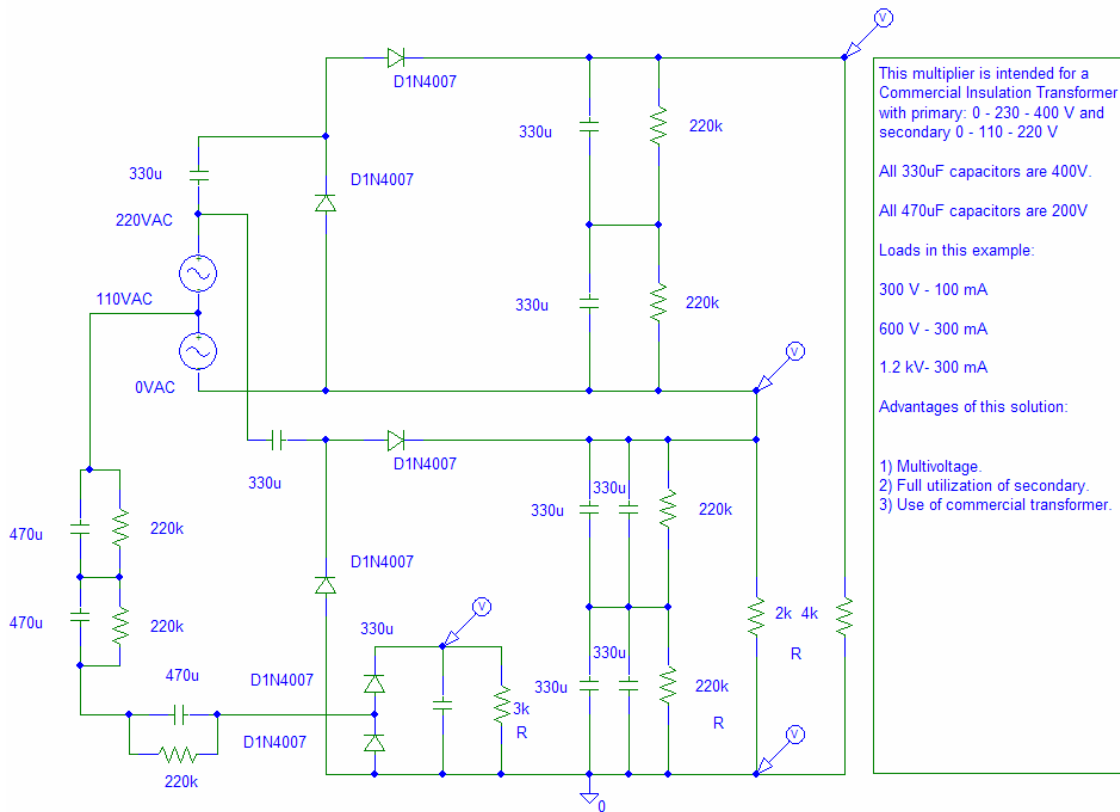


With an additional capacitor we have:

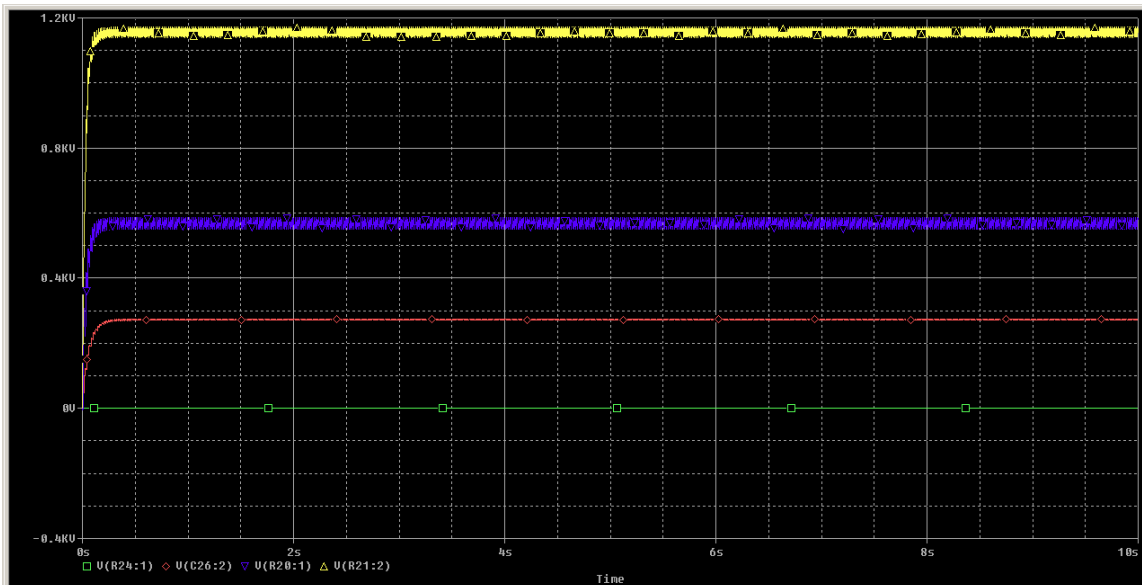


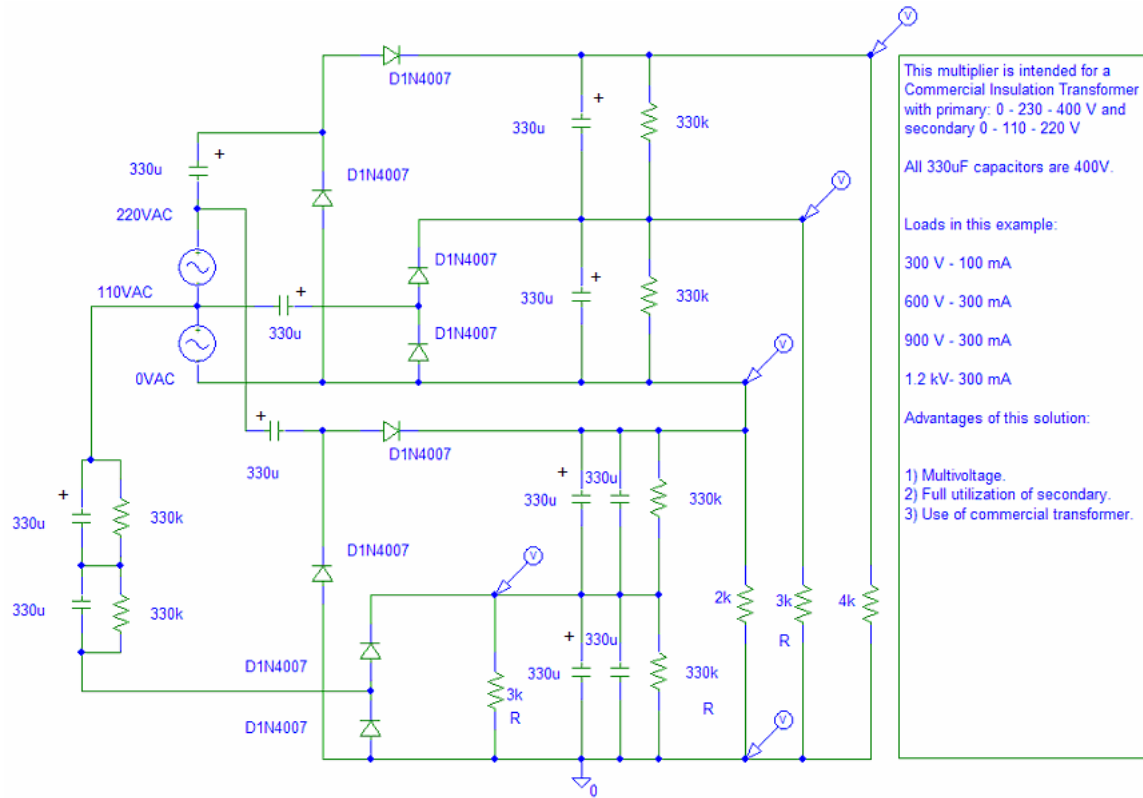
The improved design is:

More on Multi-voltage Rectifiers.



That provides:





That provides:

