DESIGN OF LM317 CIRCUIT

INTRODUCTION:

The **LM317** is a popular adjustable positive linear voltage regulator. It was designed by Bob Dobkin in 1976 while he worked at National Semiconductor. When it comes to variable voltage regulation requirements LM317 would most likely be the first choice. Apart from using it as a variable voltage regulator, it can also be used as a fixed voltage regulator, current limiter, Battery charger, AC voltage regulator and even as an adjustable current regulator.

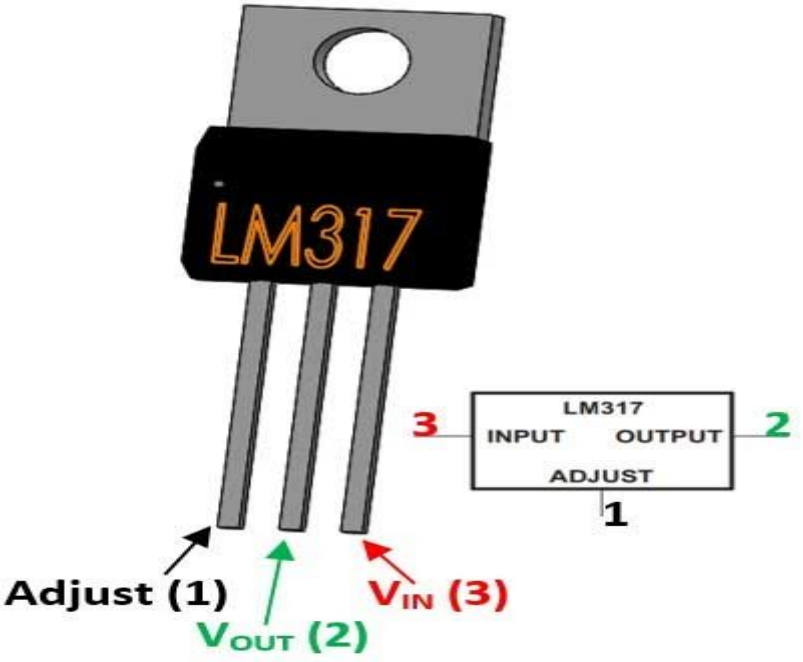


Fig1:LM317 VOLTAGE REGULATOR IC

OPERATION:

Linear regulators inherently waste power; the power dissipated is the current passed multiplied by the voltage difference between input and output. A LM317 commonly requires a heat sink to prevent the operating temperature from rising too high. For large voltage differences, the power lost as heat can ultimately be greater than that provided to the circuit. This is the tradeoff for using linear regulators, which are a simple way to provide a stable voltage with few additional components. The alternative is to use a switching voltage regulator, which is usually more efficient, but has a larger footprint and requires a larger number of associated components. The LM317 has three pins: INput, OUTput, and ADJustment. Internally the device has a bandgap voltage reference which produces a stable reference voltage of V_{ref}= 1.25 V followed by a feedback-stabilized amplifier with a relatively high output current capacity.

$$\mathbf{V_{OUT} = 1.25 \times (1 + (R2/R1))}$$

The schematic diagram of LM317 circuit is shown below.

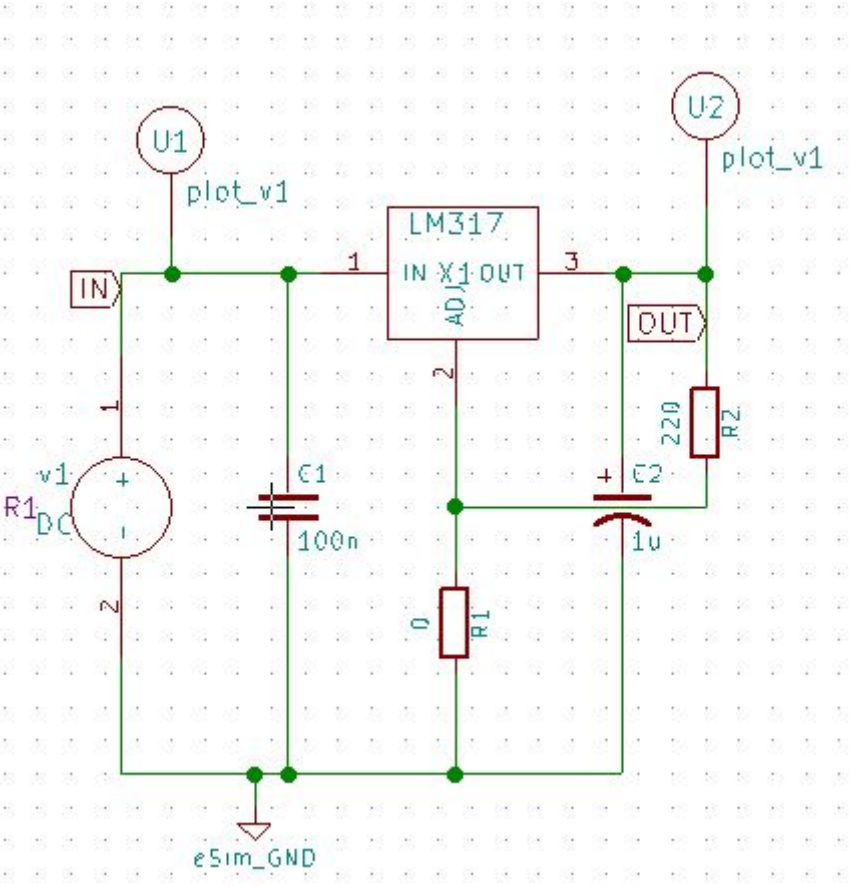


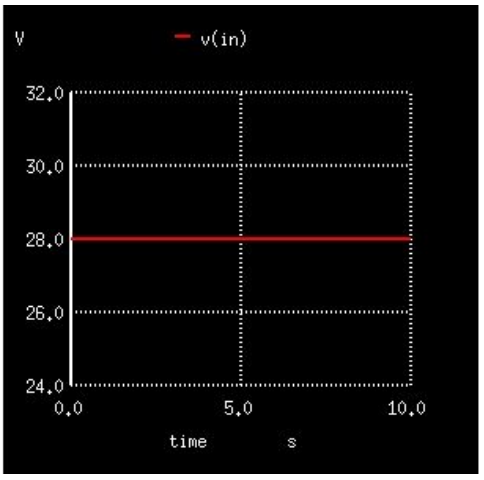
Fig2:Schematic Diagram of LM317 circuit.

By varying the resistor R1 we can obtain different voltage values ranging from 1.25V to 37 volts.Thus it is used as a variable voltage regulator.

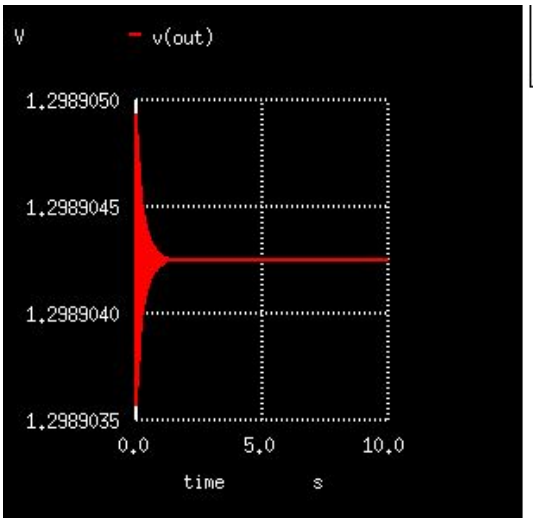
NGSPICE PLOTS:

CASE i: When V1 = 28v and R1 = 0

INPUT :

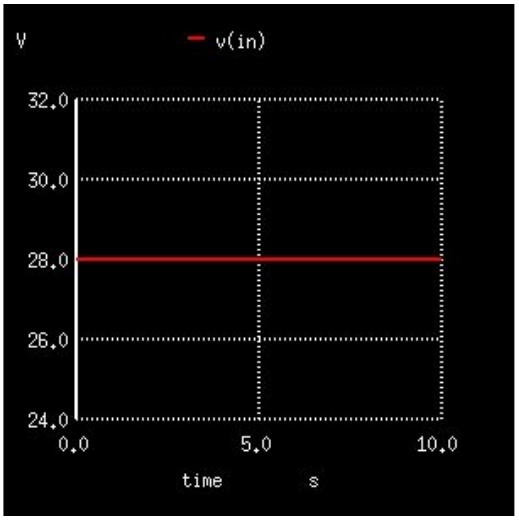


OUTPUT:

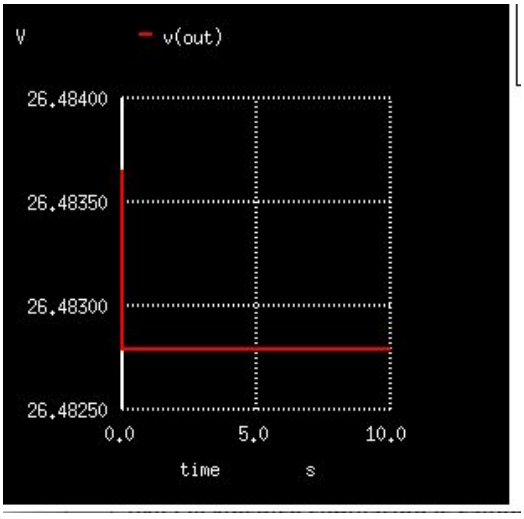


CASE ii: When V1 = 28v and R1 = 4.7k

INPUT :

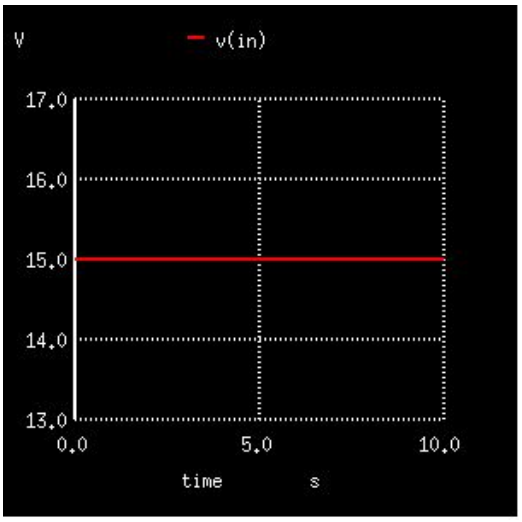


OUTPUT:

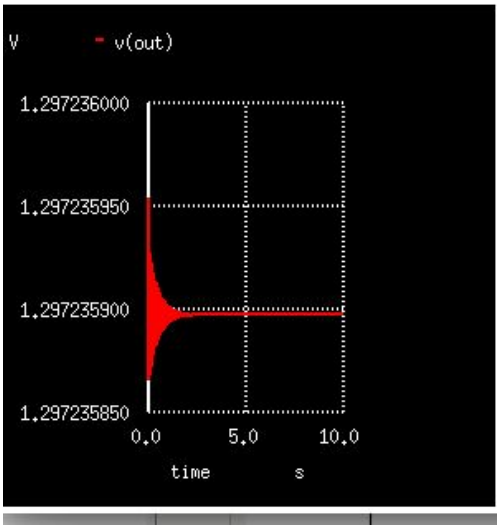


CASE iii: When V1 = 15v and R1 = 0

INPUT :

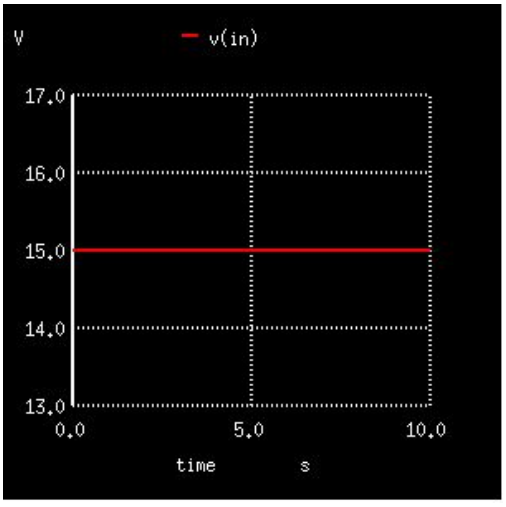


OUTPUT:

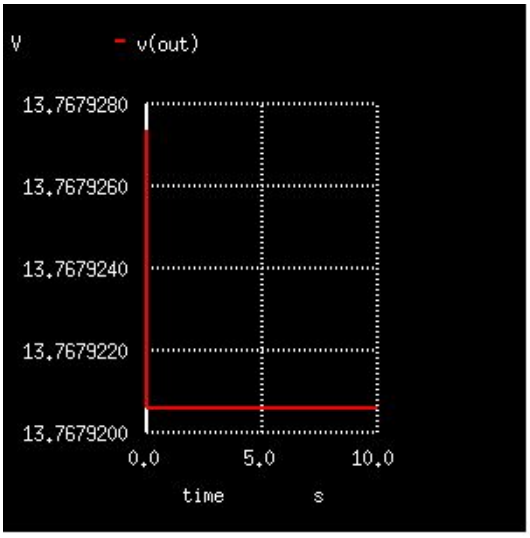


CASE iv: When V1 = 15v and R1 = 4.7k

INPUT :



OUTPUT:



REFERENCES:

https://components101.com/lm317-pinout-equivalent-datasheet
https://en.wikipedia.org/wiki/LM317