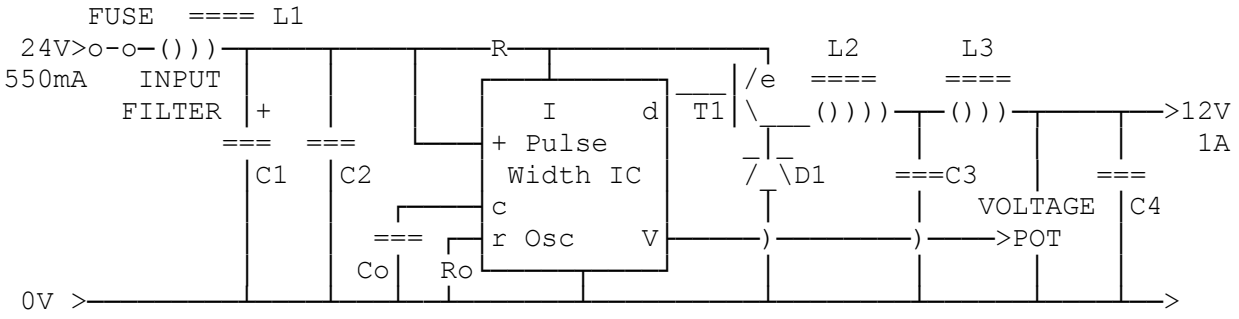
Chopper Regulators

By G8MNY (Updated Jul 11)
(8 Bit ASCII graphics use code page 437 or 850, Terminal Font)

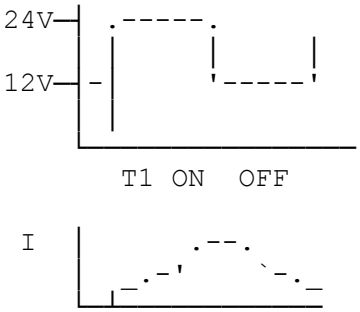
These can either be step down voltage or step up voltage type, with the current doing the inverse. Efficiency can be near to 100% in some applications.
Using an inductor to store energy they transform the power to what you want.

STEP DOWN REGULATORS

These are the most common type often from unregulated DC.



The main parts are L2, T1, D1 & C3. The controls IC may have T1 & D1 internal depending of the power rating. The IC has an variable pulse width oscillator inside that drives the transistor.

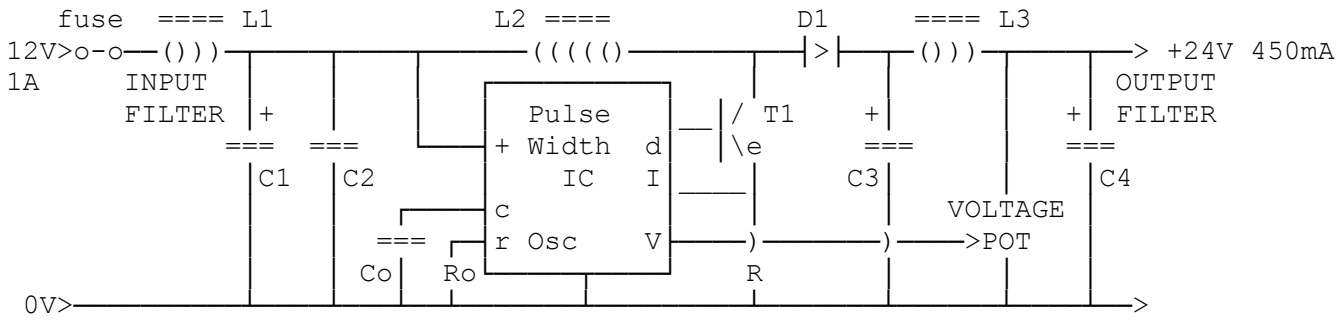


When T1 is on current builds up in L2, the R is a protection resistor to monitor over current. When T1 turns off the energy stored in L2 rings down to a high negative voltage that via D1 charges up C3. The voltage on C3/4 eventually reaches the internal reference voltage in the IC via the voltage setting pot, & this reduces the pulse width of T1's drive reducing the stored energy in L2.

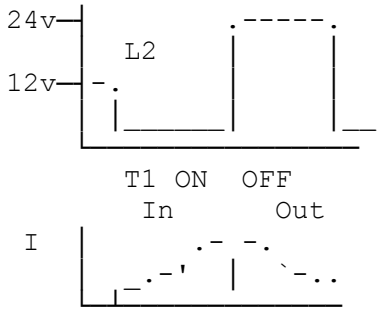
Output current from L2 flows into the load when T1 is on & off, so current addition occurs.

Due to the high current pulse nature of these systems input & output filters are needed to keep these currents in the circuit & out of the external leads.

STEP UP REGULATOR
These are used alot nowadays in PCs with low voltage batteries.



The main parts are L2, T1, D1 & C3 as before. The controls IC may have T1 & D1 internal depending of the power rating. The IC has an variable pulse width oscillator inside that drives the transistor (NPN here but could be VMOS FET etc).



When T1 is on more current builds up in L2, the R is a protection resistor to monitor over current in T1 (not the load!). When T1 turns off the energy stored in L2 rings up to a high positive voltage that via D1 charges up C3. This voltage eventually reaches the internal reference voltage in the IC via the voltage setting pot, & this then reduces the pulse width of T1's drive reducing the stored energy in L2 etc.

Output current to the load only flows when T1 is OFF, so current reduction occurs.

Due to the high current pulse nature of these systems input & output filters are needed to keep these currents in the circuit & out of the external leads.

Why don't U send an interesting bul?

73 de John G8MNY @ GB7CIP