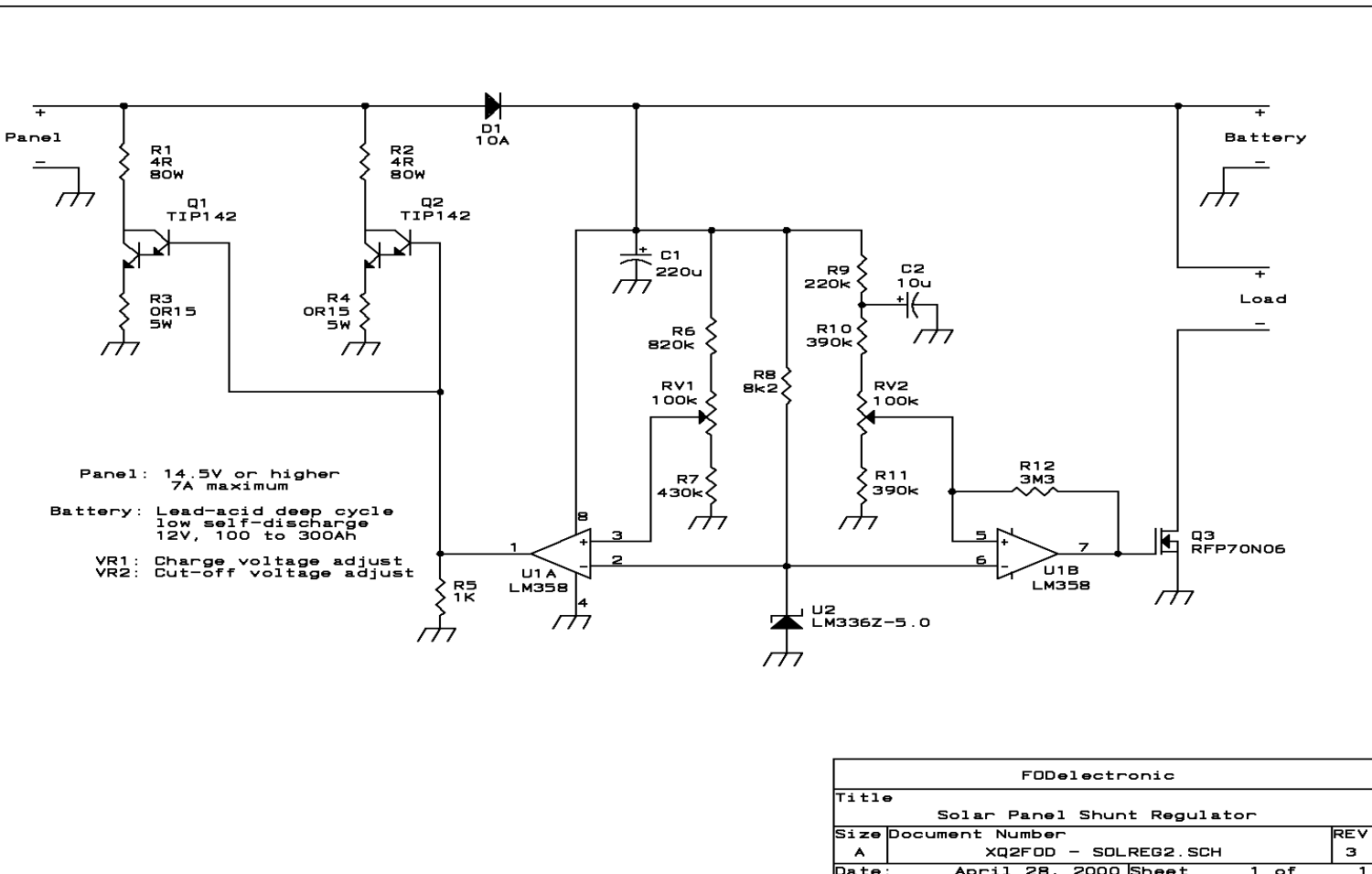


Solar panel shunt regulator

1. **Introduction** *Please translate the following.*

The circuit presented here uses linear shunt regulation. Simply spoken, it burns off all excess energy from the panel, keeping output voltage constant. At times when the solar panel output is equal or greater than the load, and the battery is fully charged, the load gets its power from the panel, while the battery rests at full charge. Five years battery lifetime are entirely normal with this system, while the same batteries last only two to three years when used with pulsing regulators! The second responsibility of the regulator is watching over the battery voltage, and dropping off the load when the battery gets discharged too much. Lead batteries are severely damaged by deep discharges, so it's far preferable to drop off the load, than to have the battery die in a bad weather spell...



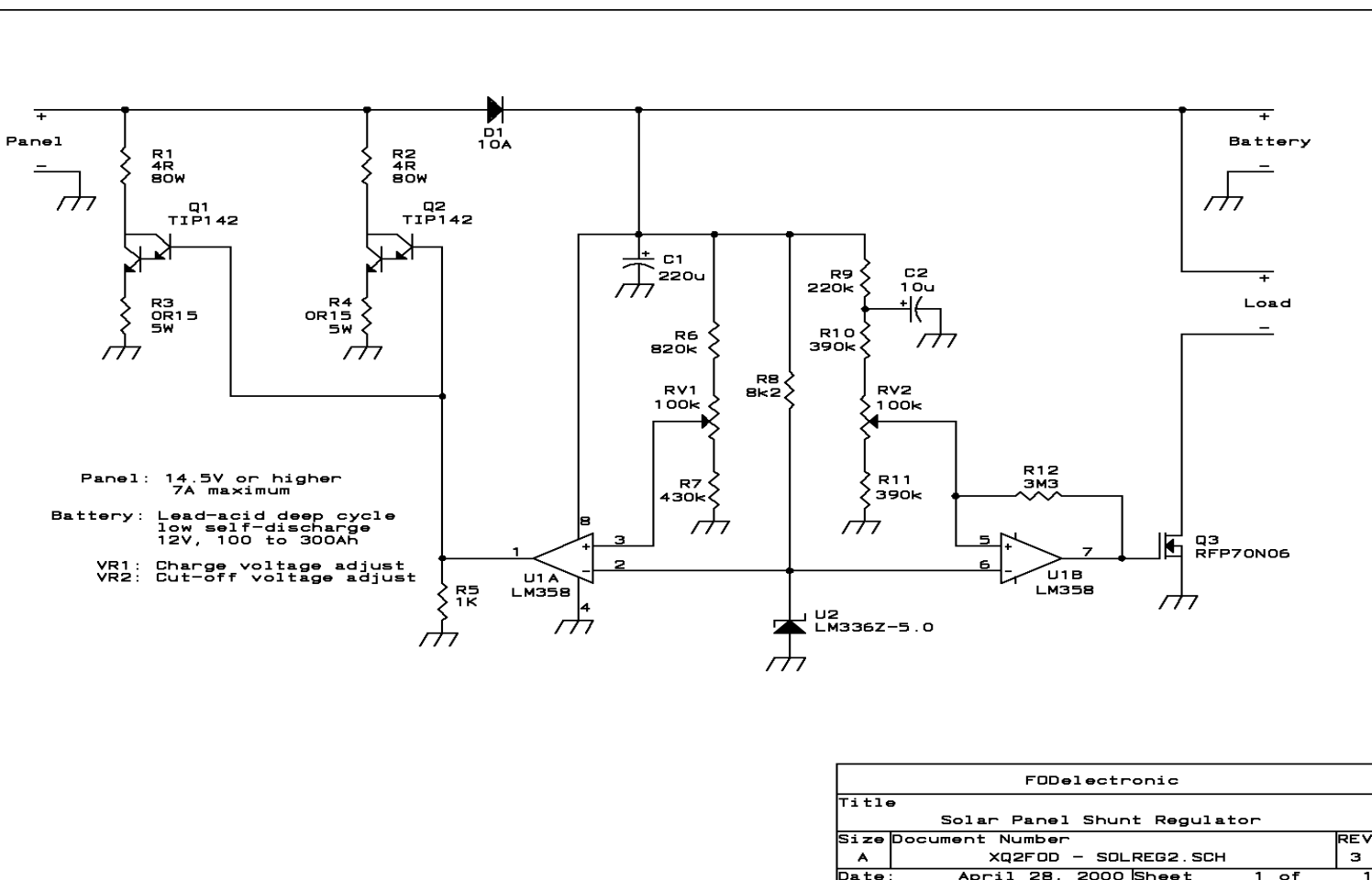
2. *Compute the maximum power of the solar panel.*
3. *Compute the maximum energy stored in the battery*
4. *To last long, a lead battery must be loaded below 1/10 of its capacity in Ah. Is it done here? If yes explain why.*

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5. Detailed operation *please translate the following*

The reference U2 is giving a stable 5V voltage on the “minus” input of U1A and U1B. These are voltage comparators. If the “plus” input of U1A trips over 5V, U1 A output voltage increases, so the transistors Q1 Q2 loads the solar panel to prevent an over voltage (overload) of the battery.

6. We admit the cursor of RV1 is set on the middle (50K on each side). Please compute the voltage of the battery that will trig the conduction of Q1 an Q2



7. In the same way, if the “plus” input of U1B trips under 5V, U1 B output voltage decreases and switch off the transistor Q3, hence the load. It is a protection against a deep discharge of the battery.
Please compute the voltage of the battery that disconnects the load (RV2 on the middle).