NOCTURNAL SOLAR ENGINES

Nocturnal solar engine designs are built for just one thing -- to provide power to a nighttime load. This means that unlike other SE designs, they charge continuously when there's light, then only release their power when it's dark -- essential behavior for BEAMbots that you only want to be active at night -- "crickets", night-lights, "pummers", and other such ornaments.

I've stumbled across a handful of designs for nocturnal SE designs:

- **D1**

  This is the "grand-daddy" of nocturnal solar engine designs. While it may be the first, it certainly isn't the best design for the job, though. I'm including it here for historical and educational reasons (but you'd be well-advised to choose one of the subsequent designs for your purposes).

- **SIMD1**

  In response to the shortcomings of the "classic" D1 solar engine, Wilf Rigter designed a nocturnal solar engine of his own. As various people posited various applications of the circuit, it soon fragmented into a whole family ofcircuit designs -- the SIMD1 (simplified D1) solar engines. Each of the

SIMD1 designs is a bit different, and so each has its own advantages and disadvantages. To date, Wilf has dreamed up 4 variants of SIMD1 solar engines -- V0, V1, V2, and the SIMD1 / Solar Regulator. I'll attempt to document and explain the latest version of each in turn.

Note that there is a qualitative difference between the D1 solar engine and most of the SIMD1 circuits -- the D1 solar engine can provide significant current to power up a circuit like a pummer while most of the SIMD1 circuits provide a logic signal for control and indication. In other words, the D1 turns off everything connected to it while charging, but most SIMD1 variants simply provide a logic output that must be used to disable other parts of the circuit.

- o **SIMD1 V0**

  The original SIMD1, the V0 does its magic with just a resistor and a Germanium diode.

- o **SIMD1 V1**

  The V1 is just like the V0, but with polarities reversed.

- o **SIMD1 V2**

  The V2 has two flavors, essentially modifications of the V0 and V1, but with a transistor and resistor replacing the diode. This variant

turns on earlier (i.e., before it's so dark) and "cleaner" than

the V0 and V1.

o **SIMD1 V3**

The V3 is very similar to the NPN flavor of the V2, but with the

addition of a FET on the output line. This makes life easier for its

attached load.

o **SIMD1 / Solar Regulator**

The SIMD1 / Solar Regulator supplies a constant 2V after triggering

and permits driving LEDs with constant brightness without the need

for current limiting resistors.

Source: http://www.solarbotics.net/library/circuits/se_noct.html