LEIT 2
Operational Description

The following document is a brief description of the circuit functions of the LEIT 2.

The LEIT 2 is a solar power, radio controller irrigation controller. Its job is to actuate a solenoid to turn on/off irrigation valves. All power comes from the sun. The energy collected by the PVM (photo voltaic module – the solar cell) is stored in super capacitors. The controller is controlled via a wireless handset. All functions of the controller are set with this.

RF modulation is FSK, modulated in position/phase, intended for data transmission.

The following is a breakdown of the circuits. Please refer to the LEIT 2 schematics for reference.

Microcontroller schematic:
The MSP430F1232 microcontroller is used to control the device. All logic function takes place here. Some of the functions of the microcontroller: monitor available power, actuate the solenoid, and interface with the radio.

Charging schematic:
All power is stored in super capacitors. This provides a constant source of power from the fluctuating power of the PVM. The capacitors are placed in series. Cell balancing circuitry ensures no cell will achieve an over voltage condition.

Power schematic:
The system runs at 2.5V. A linear regulator regulates the power from the super caps to provide a constant voltage of 2.5V. However, a 9V pulse is needed to actuate the solenoid. A step up regulator boosts the voltage from 2.5V to 9V before actuating a valve.

Output schematic:
Once the step up regulator boosts the voltage to 9V, the output circuit provides a path for the voltage to the solenoid. There are two lines on the solenoid (RED and WHITE). To turn on the solenoid, a 9V pulse is applied to RED and white is pulled to ground. To turn off the solenoid, the polarity is reversed.

Radio schematic:
The Chipcon CC1100 chipset is used for the radio. A few external components are needed (decoupling caps, and balancing). The microcontroller sets up the radio to work at the desired frequency and power, and enables/disables communication.