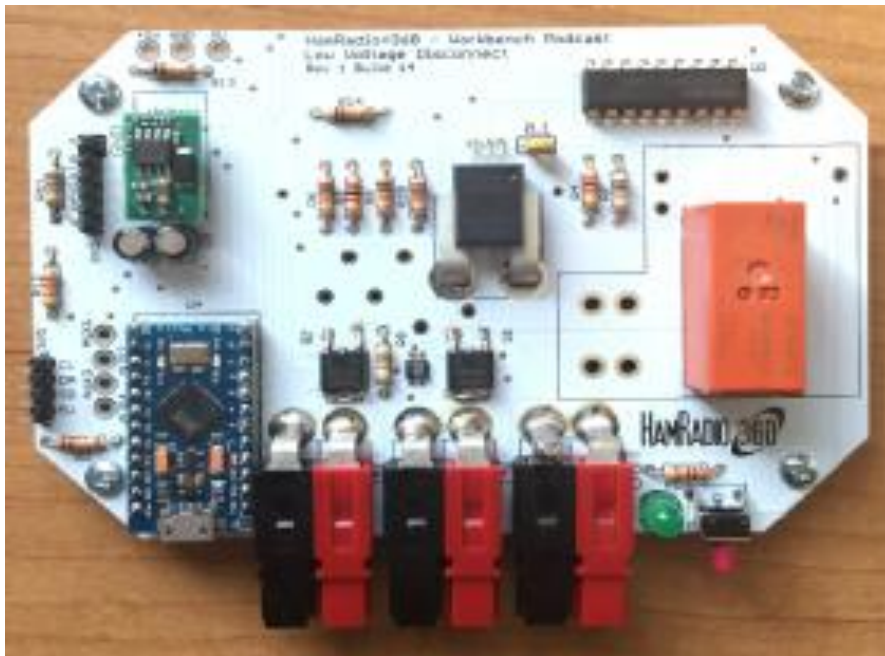


12v Power Controller Project Board

The Workbench Podcast



Introduction

- This board provides three functions...
 - DC power gate
 - Low voltage disconnect
 - Voltage / current display
- The typical usage for this board would be in your home or portable station where you are using SLA (lead acid) batteries and you want to keep the batteries from over discharging and damaging the cells.
- The board comes with the LTC power chip pre-installed because it's so tiny. You will have to install all other parts.
- The board is fabricated using 3 Oz copper. This is 300% more copper than the typical board material uses in order to handle much higher current.

Here is how it works

- There are two 12 v (13.8v) DC inputs using Anderson PowerPoles. The LTC chip on the board measures the voltage of the two inputs and whichever is higher, will be gated on and pass the current through a power transistor to a latching relay.
- Typically one of the inputs is for your battery and the other input is for your 13.8v power supply. Normally the power supply voltage will be higher than the battery and the load will run off the power supply. If your AC power fails, the power supply output voltage will eventually drop to zero and the circuit will automatically switch to the battery input.
- The Arduino Pro Micro microcontroller monitors the DC voltage. If the voltage is within a pre-set range, the power relay will be closed and the power will flow to the PowerPole output connector. If the voltage is too high or too low, the microcontroller will cause the relay to open and remove the load from the battery. The safe operating range is typically between 11.5v and 16v. These threshold values are set in software so you can change them.
- There is a 4 pin header connector that can be connected to a 2 line x 16 character LCD display that supports the I2C bus interface. The power controller measures current flowing through the circuit as well as voltage and both can be displayed on the LCD.

12 Volt Power Controller

Assembly

- For just about all the components, simply place the components according to the silkscreen printed on the board.
- SPECIAL NOTE: If you have the original beta version of the board with the power transistors installed, you must remove them and replace them with these transistors from Digikey...

IPD90P04P405ATMA1CT-ND

There are a few choices that you can make and a few recommendations. READ THIS...

- You can choose from two DC power relays. The smaller of the two will handle up to 16 amps. With smaller traces we would rate this option to handle a total of 12-15 amps. The larger relay is more expensive but can handle up to 30A. In the case of the larger relay we rate the whole circuit at 20 amps.
- If you are ever concerned about the PCB traces being large enough to handle the current, you can always solder some buss wire to the contacts on the bottom of the board.
- If you are pinching your pennies and don't want to measure current, you can leave the current sensor device out of the circuit. Just install some heavy duty wire between the two big holes where the device tabs go. Don't worry about the other three little pins.
- We use a switching regulator module because when you drop the voltage from 13.8v to 5v to run the microcontroller, a typical linear regulator would get warm or hot. In a pinch, you can put in a good old 7805 linear regulator. If you do this, you must put it in backwards. The pins on the switching regulator are the same as the 7805 but backwards. Just use the recommended switching supply module. You will be much happier.
- If you are sourcing parts from your junk box, make sure you use 1% resistors on the ADC inputs so the measurements will be accurate.

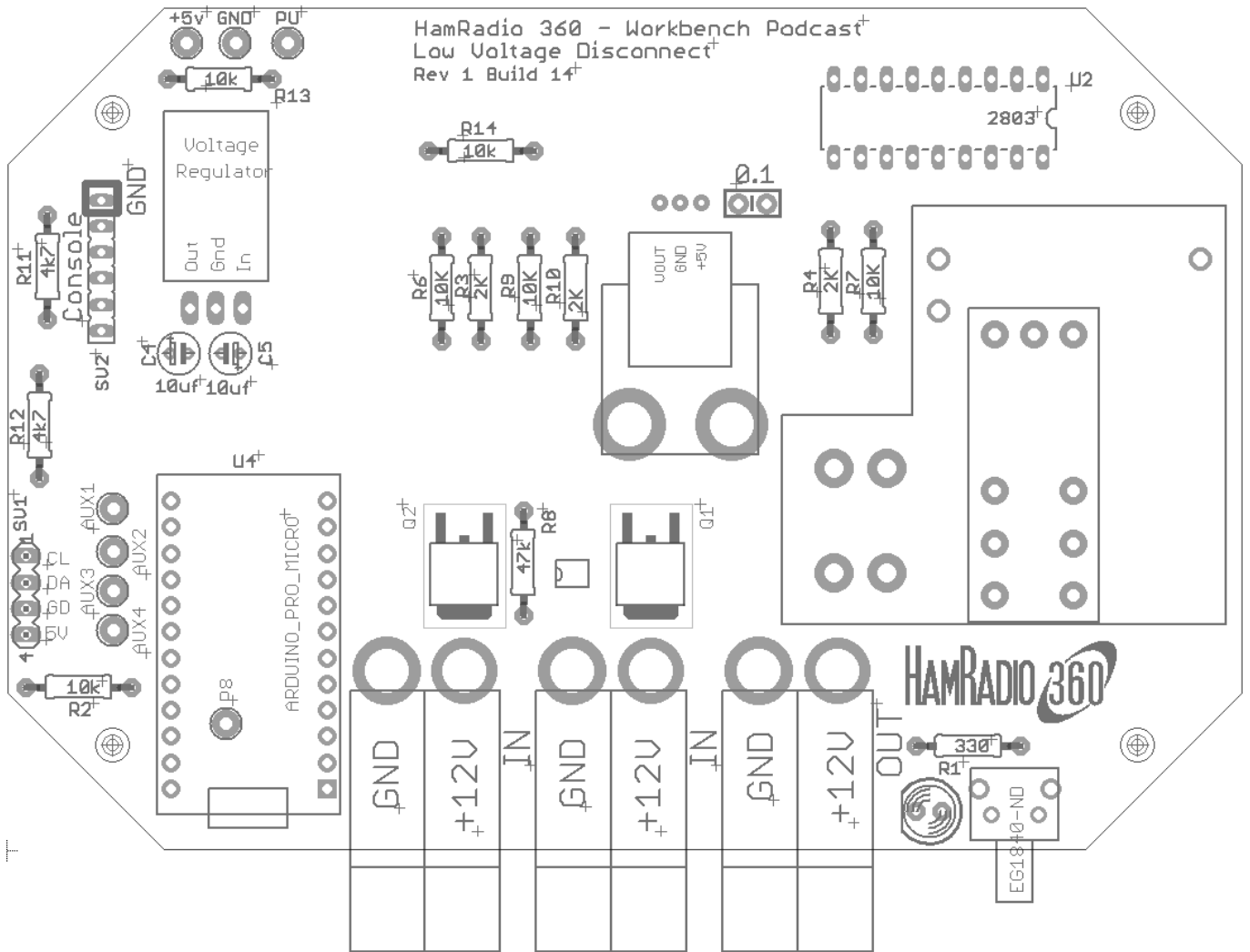
Firmware

- You will need to install the Arduino development software on your computer and add the board type called the "Arduino Pro Micro" from SparkFun. Instructions to do this are on the www.360workbench.com web site under the Antenna Analyzer build project links.

Case

- The board is designed to fit a Polycase LP-55FMB.
<https://www.polycase.com/lp-55f>

12 Volt Power Controller Parts Placement



12 Volt Power Controller Schematic

