Controller assembly instructions

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5/29/16

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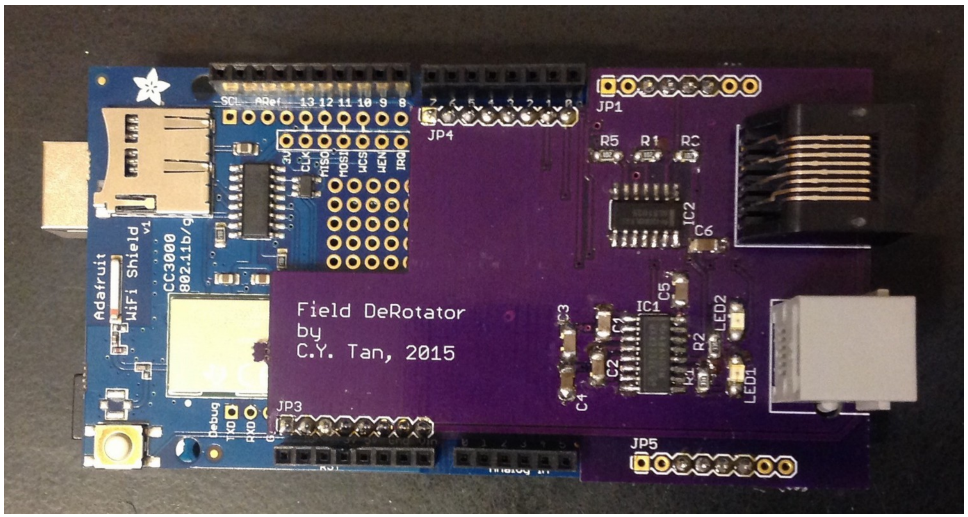
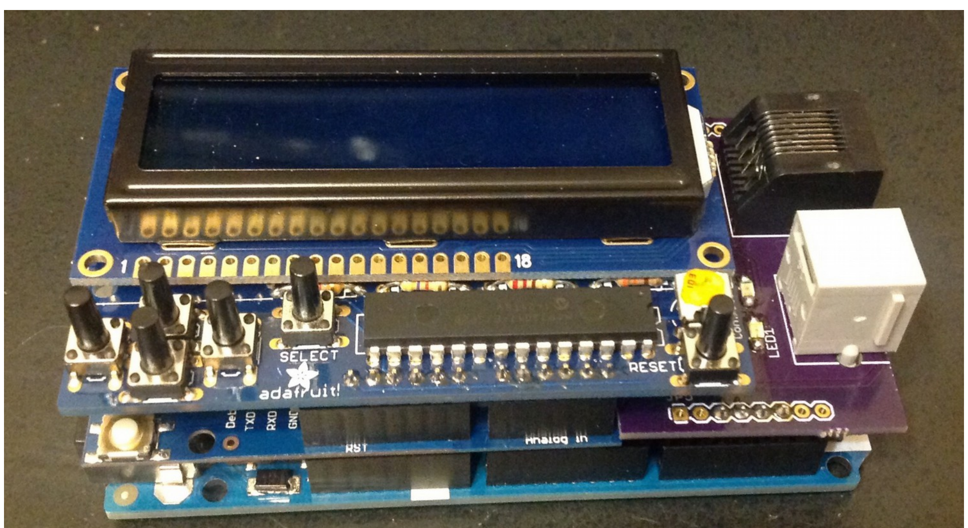
Controller board

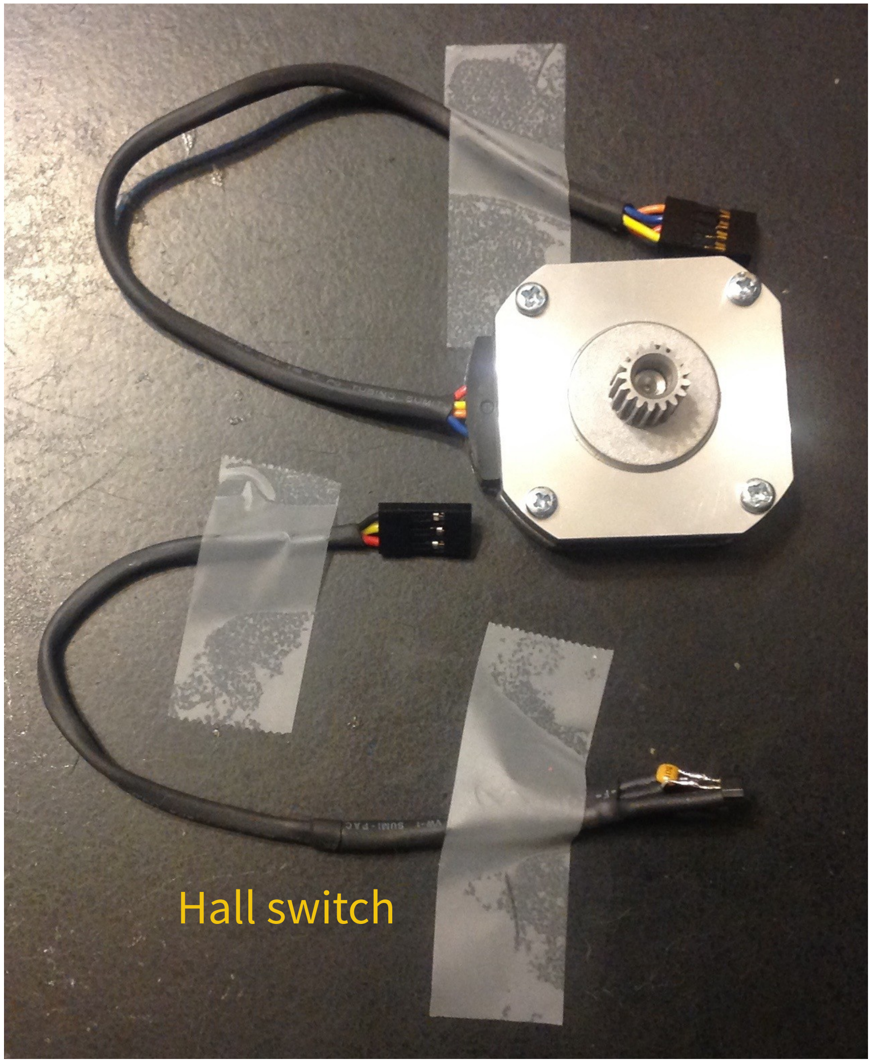


The controller board is soldered onto the WIFIshield and insterted into the MEGA2560 board.



Then the LCD shield is inserted above the WIFIshield

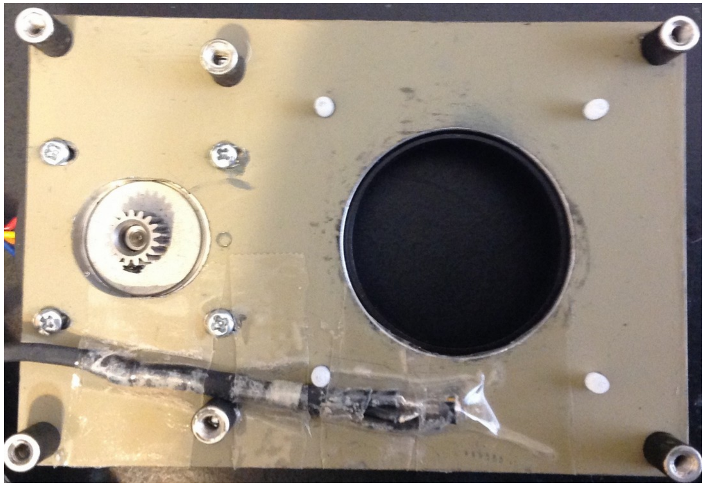
Hall switch

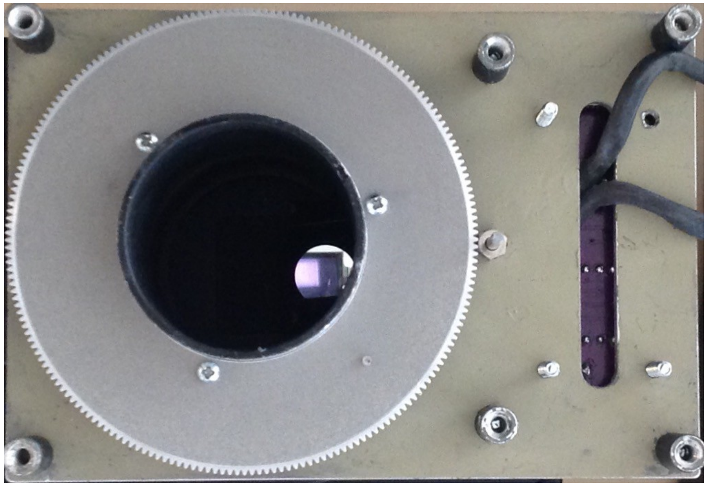


The Hall switch is soldered to wires and socketed.

A decoupling capacitor 0.1 uF is soldered directly to pins 1 and 2 of the Hall switch.

Hall switch taped to the cover

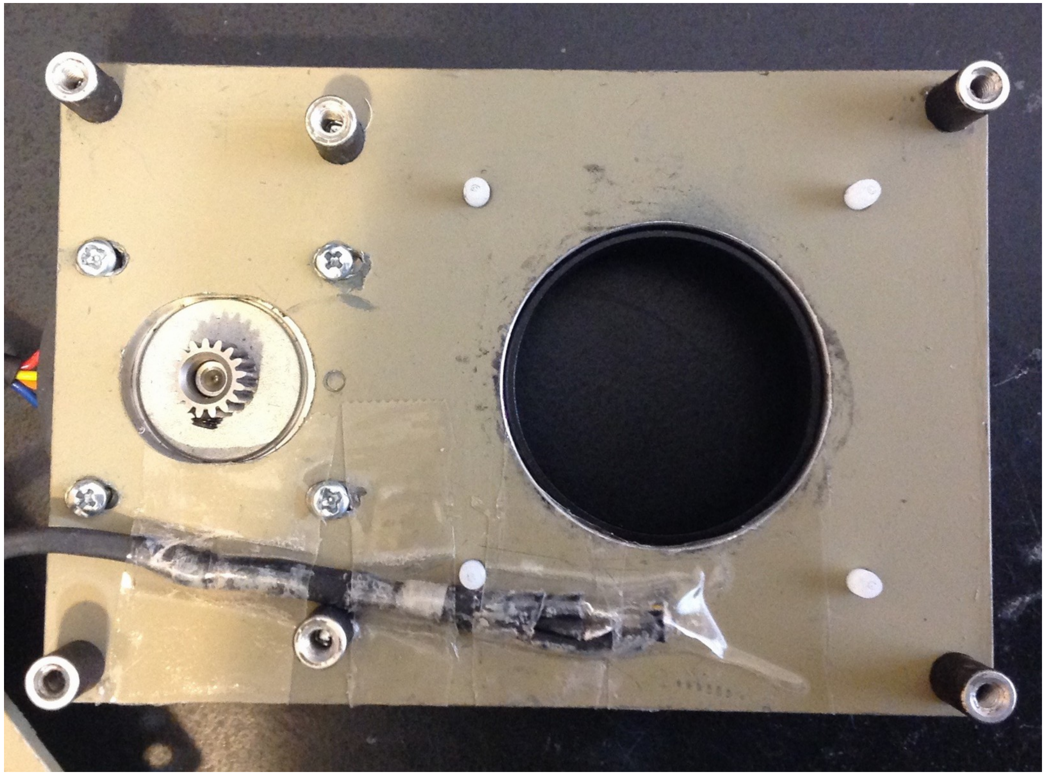




Gorilla tape is used to tape the Hall switch on the cover. Since it is transparent, you can see the orientation of the Hall switch and its location.

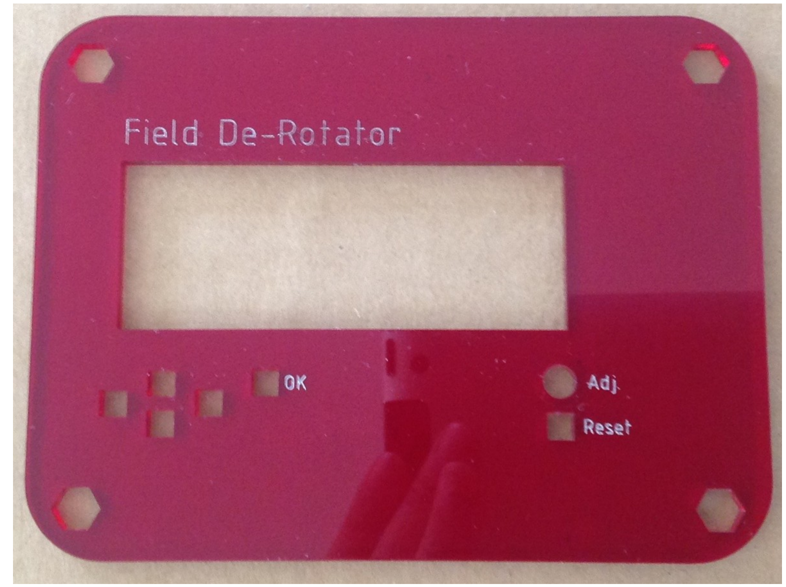
The cable from the Hall switch is slipped through the other cover's slot.

Taping the Hall switch to the shell



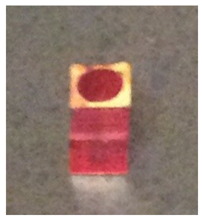
Only gorilla clear tape is strong enough to hold the Hall switch and cables in the correct orientation. The picture shows the residue of the other tapes like duct tape. The clear tape helps to place the Hall switch at the correct location that I have marked on the shell.

Assembling the slice case



The front cover of the sliced case has letterings that has to brought out by filling in the grooves with silver leaf rubbing compound. Some of silver leaf is smeared onto the letterings and then wiped off. A little bit of acetone helps with the wipe off.

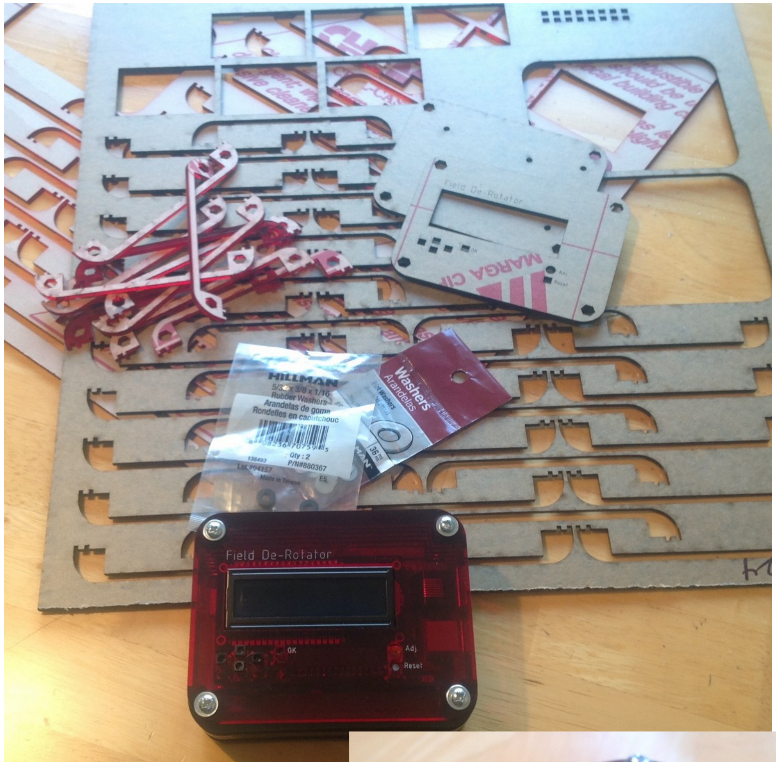
Making the push button switches



Pushbuttons on the controller are made by supergluing two cubes with holes together. These cubes with holes come from the same plastic that was laser cut with the other case parts.

This assembly is then superglued to the push button stems. Good thing is that the push button stems rotate, so that they can be easily aligned to the square holes on the case cover.

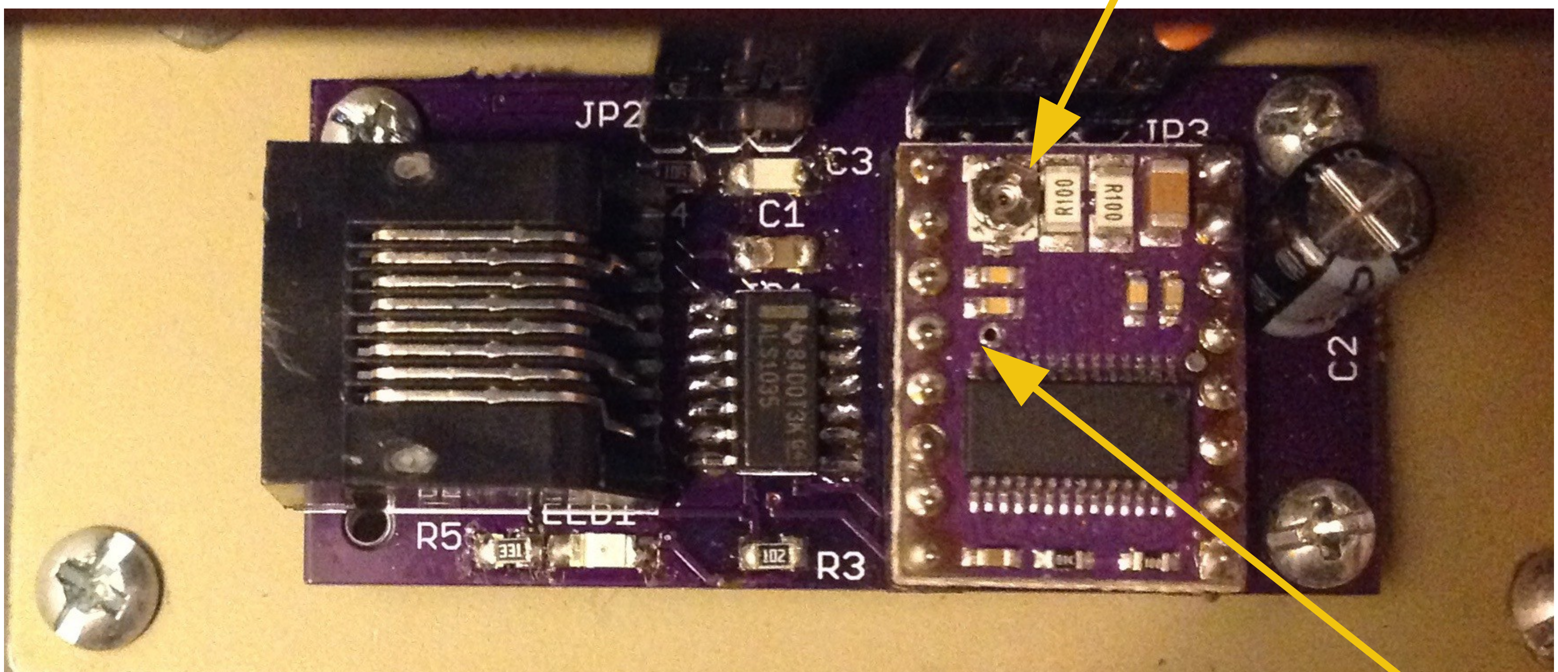
Building the case



The slice case is assembled with alternating flat and thin slices. The side panels of the case are chosen from 1 of 3 options, each having a different height.
The slices are held together with 4 hex standoffs.
The small excess height of the top cover is made flush to the LCD using 4 rubber washers inserted between the last slice and the top cover.

Making the driver

Adjust here



Measure voltage here.

The voltage on the stepper motor driver must be adjusted with the pot. The Pancake Sanyo motor doesn't like 1A max setting. It gets hot and whines a lot. So it has been set to 600 mA max. This corresponds to 0.3 V at the test point. See also https://www.pololu.com/product/2133

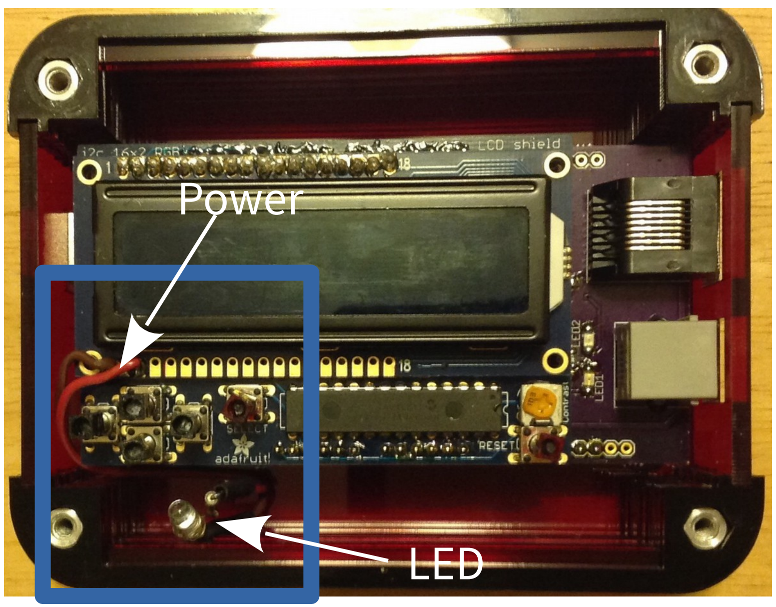
Done!

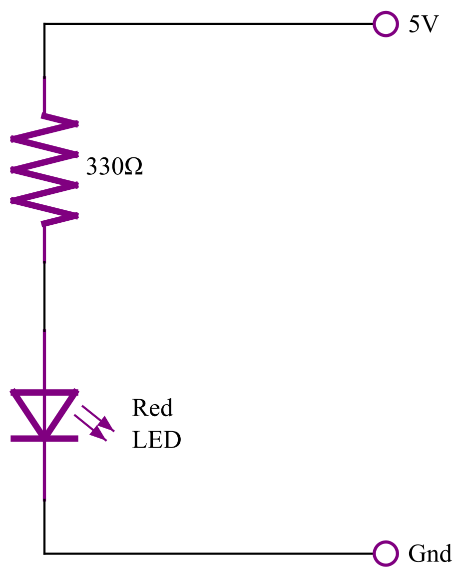
The controller is assembled and it is programmed using a USB cable connect to a computer, and the Arduino JAVA GUI. The controller can now be connected to the derotator. See

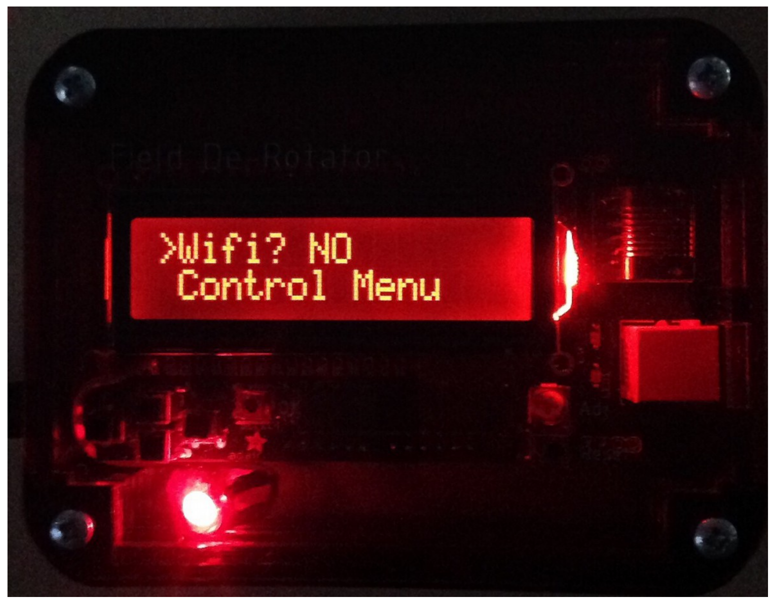
- **Installing the Field DeRotator**
- **Field DeRotator Controller User's Guide**

Adding an LED light

I found that the I couldn't see the pushbutton switches during operations, because there's no light :) So, in order to fix this problem I added a red LED light to the enclosure. The circuit is trivial (see below). Power to the red LED comes from the left most pin (GND) and the pin next to it (+5V) on the LED display. And voilà, there is enough light to see the pushbuttons.







Addendum

After I built my power distribution unit, I discovered that the 9V from the my distribution unit did not have enough power to turn the gears of the derotator although the 9V brick supply was able to power it.

My measurements showed that the brick's power output is 9.3V while the power distribution unit is 9.0V. It looks like 9.3V is sufficient to power the derotator but 9.0V does not.

The simplest solution is to use 12V to power the field derotator. I have tested the field derotator with the 12V from the power distribution unit and it worked well. <u>Therefore, as of 21 May 2016, the field rotator runs on 12V input power.</u>