Griffin Rzonca, David Mengel, Aditya Anand

9/18/23

Team 13 9/18 Meeting

Goals:

* Power Supply Circuit Schematic
* Parts list
* Simulations

Project Timeline: <https://calendar.google.com/calendar/embed?src=c_83cfdaae2261c2f04fc39ed79b0067e3b328b89de4dfe9ad915334b1e060046e%40group.calendar.google.com&ctz=America%2FChicago>

Questions for Jason

* Can we copy/borrow Tesla Coil assembly design and ask machine shop to replicate it?

**Circuit Considerations:**

* Take AC mains, convert to DC, use to drive coil
* Output 100kV, turn ratio roughly 1:200, so input coil V should be roughly 500V
* AC mains to Variac to primary coil (1:200) to secondary coil
* 240V to 240V (or less) to 480V to 96kV
* Need a cap to filter rectified DC after step up transformer, reduce ripple
* See ripple calculation screenshot for further details:
* I/(60Hz\*50mF\*500V) \* 100 = X% Ripple
* 35A = 2.34% Ripple
* Drive at resonance
  + Considered using Vl = L dI/dt and high switching frequency to generate high voltage with low voltage rails from mains
  + However, this may be more complicated, efficient to drive at resonant frequency
* Turns ratio: roughly between 1:100 and 1:200
  + Actually, look into higher turns ratio, maybe around 1:500 or 1:1000

**Jason’s Observations:**

* Include required tolerance of frequency for MCU - prob within 50Hz of 100kHz
* Circuit Schematic and LTSpice Sim by next meeting
* Split up work into modules, meet a few times and review each others’ work
* Aditya - Audio Processing
* Griffin - Gate Drivers and Switching
* David - Power
* David and Griffin - Coil Assembly
* People don’t like anything above 500V - don’t need step up transformer
* Jason has an inkscape document
  + Don’t need it tho if we want our other software
* NEED to improve block diagram
* Only place we can do a ckt symbol in the Block Diagram section is for the coil