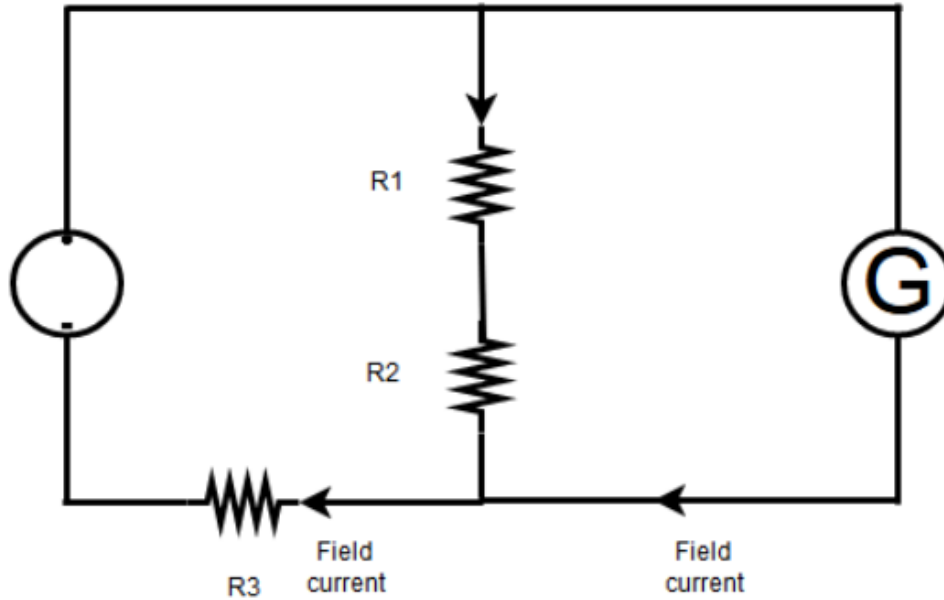


# Senior Design Project 29 Testbed Usability Report

Zuhao Zhou V00693856

1. DC circuit part: (Channel#6  $V_{DC}$  )



The DC power supply was connected between  $R_1$  and  $R_3$ . Then, according to the testbed, a multimeter was connected to the corresponding channel interface on the front panel of the testbed to read the voltage across the resistor  $R_2$ .  $V_{R2}$  represent the terminal voltage. The DC V/I circuit is connected to DAQ device. Therefore, the DAQ device is limiting the range of the V/I circuit. The DAQ should not exceed 11V. So, we should set 10V is our max. Afterwards, Wahab set a ratio to display exact value of terminal voltage of synchronous machine, which is 21. We need to calculate the ratio by each test and get the average value of it.

# Test	DC Power Supply (V)	Multimeter (V)	Ratio
1	9.6	0.459	20.915
2	18.8	0.901	20.866

3	29.2	1.399	20.872
4	39.7	1.900	20.895
5	48.7	2.332	20.883
6	52.9	2.536	20.860
7	65.7	3.147	20.877
8	72.1	3.451	20.892
9	84.0	4.022	20.885
10	92.7	4.44	20.878
11	105.5	5.05	20.891
12	110.0	5.27	20.873
13	114.1	5.46	20.897
14	123.2	5.90	20.881
15	134.4	6.44	20.870
16	143.2	6.86	20.875
17	147.7	7.07	20.891
18	150.2	7.19	20.890
19	154.7	7.41	20.877
20	155.1	7.43	20.875
Average Ratio= 20.88215			

**Conclusion:** The value of average ratio is close to 21. This means the DC circuit part has the usability.

**Advise:** We need to start the generator to measure the field current  $I_{DC}$

## 2. CT shunt resistance

The CT shunt resistance was paralleled with current transformer. Its power value does not allow us to test it with high current and high voltage. We simply use the law of resistance to measure the value, then compare the value shown by the power supply machine and the value displayed by the multimeter.

### a) CT1, 1Ω, 10W

# TEST	Supply Voltage(V)	Supply Current (A)	Multimeter(A)
1	0.4	0.3	0.307
2	1.2	0.99	1.011
3	1.6	1.32	1.35
4	2.3	1.91	1.954
5	3.1	2.62	2.678

### b) CT2, 1Ω, 50W

# TEST	Supply Voltage(V)	Supply Current (A)	Multimeter(A)
1	0.4	0.3	0.307
2	1.2	0.99	1.011
3	1.6	1.32	1.35
4	2.3	1.91	1.954
5	3.1	2.62	2.678
6	3.9	3.23	3.301
7	4.4	3.70	3.782

8	5.1	4.26	4.35
9	5.9	4.91	5.02
10	6.7	5.63	5.75
11	7.2	6.02	6.16
12	8.0	6.66	6.81

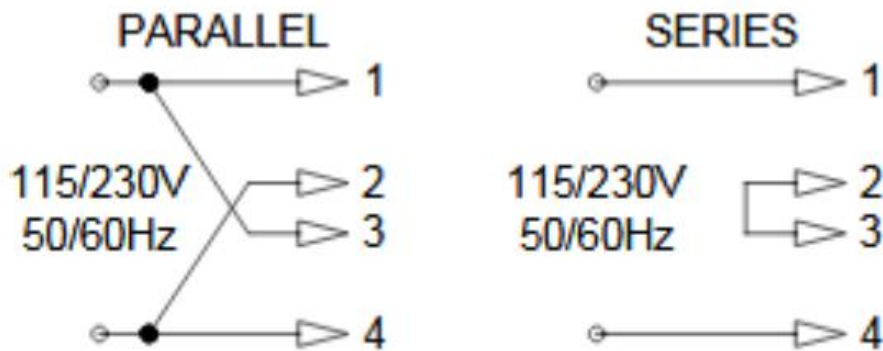
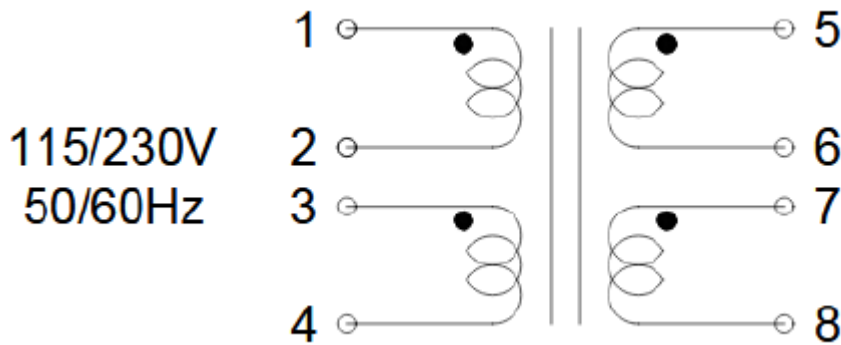
c) CT3, 1Ω, 10W

# TEST	Supply Voltage(V)	Supply Current (A)	Multimeter(A)
1	0.7	0.63	0.647
2	1.3	1.09	1.084
3	2.1	1.77	1.765
4	2.8	2.41	2.421
5	3.3	2.99	3.006

**Conclusion:** According to the data we measured, we can see the value of CT2 and CT3 has changed by unknown reason. The ratio of voltage to current is an exponential function, not a proportional relationship.

**Advice:** If we want the CT part to be usable, it is better to replace the old one with a new 1 ohm, 50 watts new resistor. This also benefits the effectiveness of the synchronous generator test,

3. PT part (Potential transformer 230V:12V)



We should connect the primary side of PT to the AC power supply and use multimeter to read values at secondary side, then compare the ratio. Due to the close of power lab, we can not reach the AC power supply.

**Advice:** According to the previous test, the value of PT seems not change too much. But we still need to test it to ensure its usability