

EE 340L
EXPERIMENT # 5.3
Parallel Operation of Two Generators of Same Size

a) Synchronization

1. Connect two motor-generator sets through the synchronizing light bulbs and power meters as shown in Figure 1 with the load bank turned off.
2. Start Generator I and bring it to synchronous speed and rated terminal voltage.
3. Start Generator II and bring it to synchronous speed and rated terminal voltage.
4. Synchronize the two Generator sets.

b) Real Power Sharing

1. Connect a load of $150\ \Omega$ (per phase). Note the real power generated by each of the two generators and shaft speed.
2. Adjust the two governors (i.e., field rheostat of the DC motors driving the shafts), such that Generator I supplies 67% of the load and Generator I supplies 33% of the load at 60 Hz frequency (i.e., speed = 1,800 rpm).
3. Adjust the two governors such that Generator I and II share the load equally at 60 Hz frequency.

c) Reactive Power Sharing

1. Replace the resistive load bank with an inductive load bank of 0.4 H (per phase). Note the reactive power supplied by each generator and the shaft speed.
2. Adjust the two generator field currents such that Generator I supplies 67% of the reactive power demanded by the load, and Generator I supplies 33% of the load reactive power at 60 Hz frequency.
3. Adjust the two field currents such that Generator I and II share the load equally at 60 Hz frequency.

d) Real and Reactive Power Sharing

1. Now connect both the resistive ($150\ \Omega$) and inductive load (.4 H) in parallel.
2. Adjust the two field currents such that Generator I and II share the load equally (both real and reactive power) at 60 Hz frequency.
3. Adjust the two field currents such that Generator I supplied only the load reactive power, and Generator II supplies only the load real power at 60 Hz frequency.

Questions:

1. Explain why raising the speed of one generator results in a speed increase of the other generator.
2. Explain how the utility determines how much real power is to be supplied by each generator at a given load.
3. Dispatching reactive power does not affect the rotor speed, while dispatching real power has a significant impact on rotor speed.

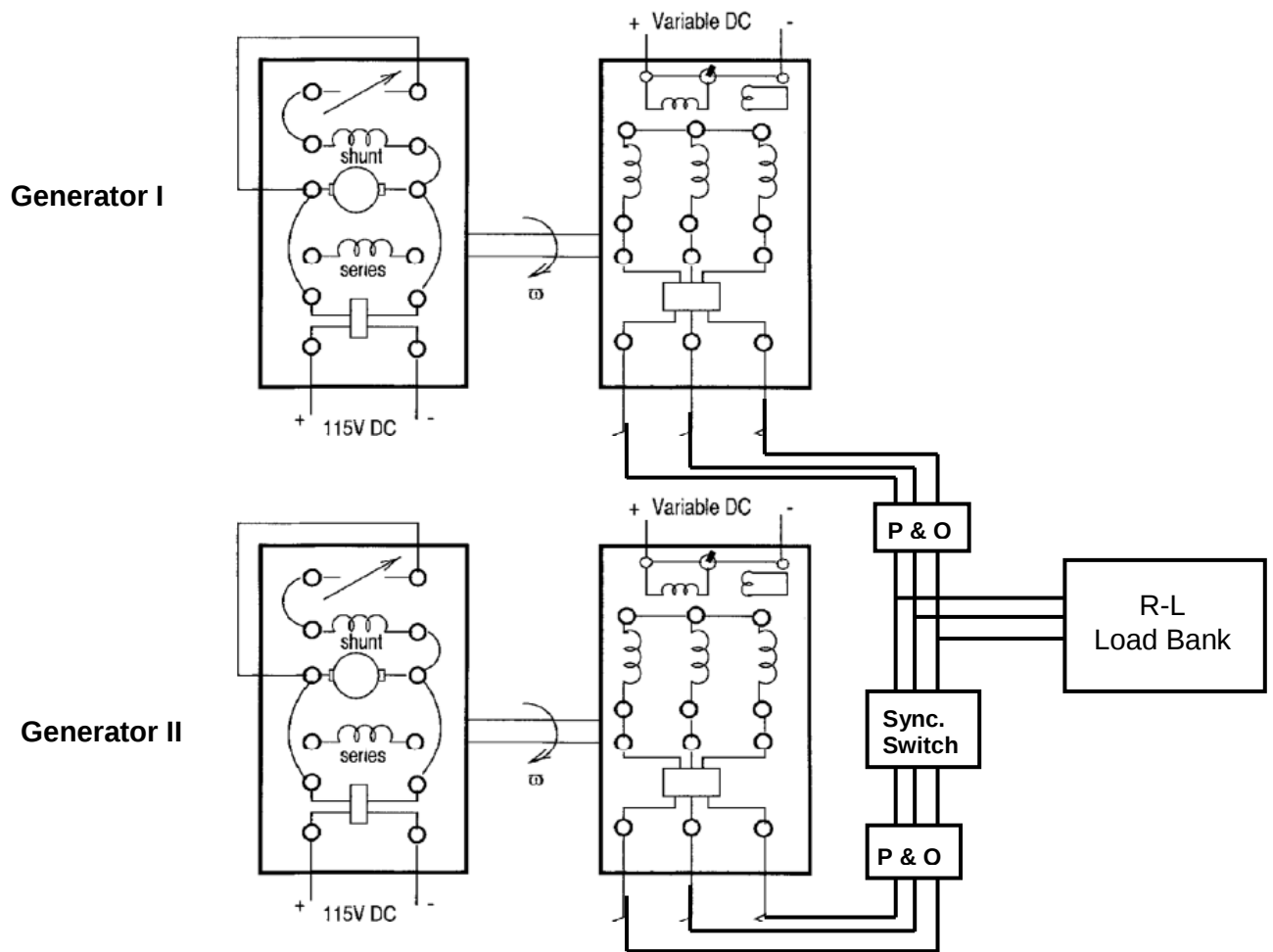


Fig. 1