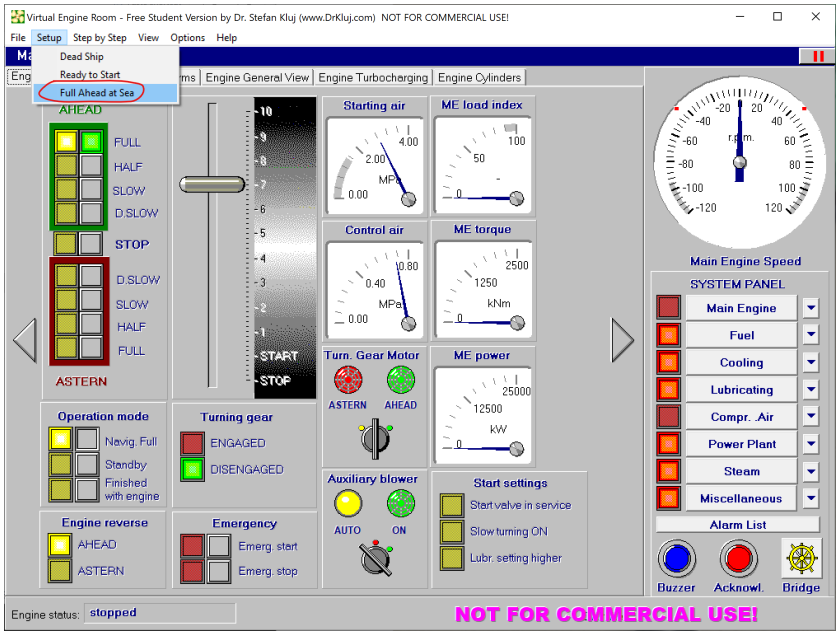
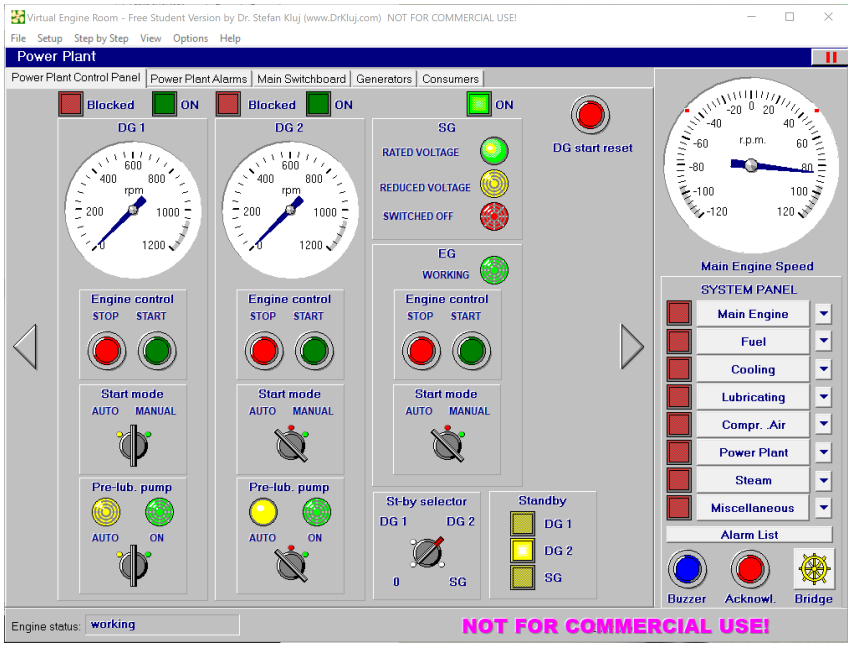
Lab 2 Outline - Electrical Systems

1. Open the Virtual Engine Room program, then in the Menu bar select "Setup" then "Full Ahead at Sea" 🙂

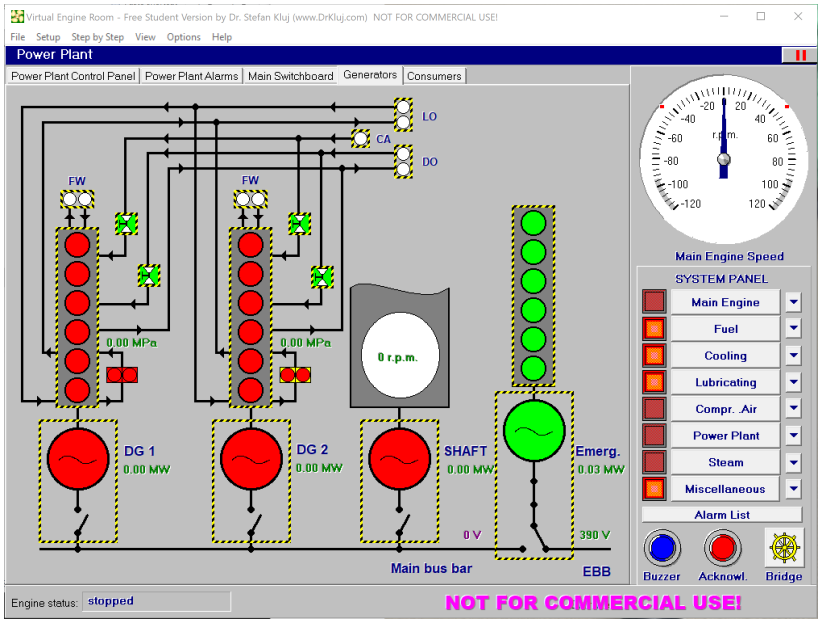


2. Go to the Power Plant system, and practice manually starting and stopping, each DG and the EG.

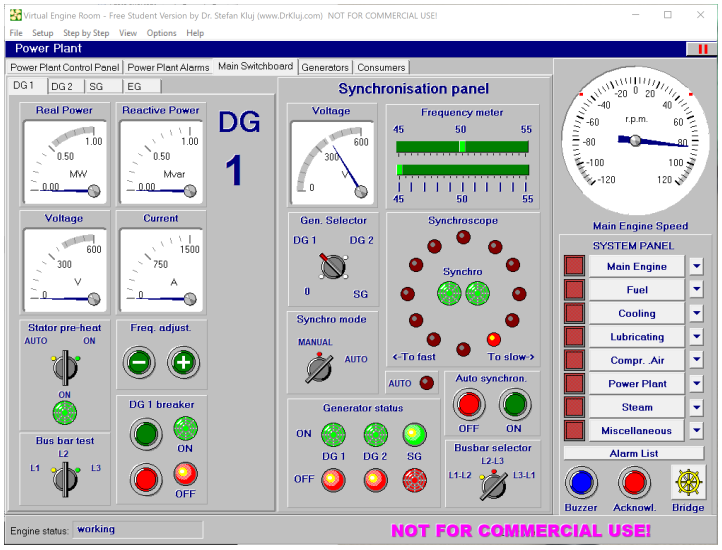


3. Then check the Auto Startup system. Make sure DG2 is in AUTO and selected as the St-By Gen on the Power Plant Control Panel. Then reduce power on the ME, using the Control Level on the Main Engine tab to somewhere less than 60 RPM. Note what RPM when MBB begins to drop. When does DG2 come on? What happens to the main engine?
4. Reselect "Full Ahead at Sea" to reset the ship with ME on.
5. Turn on SG2 manually (but don't connect it to the Main Bus), then repeat the RPM lowering, what happens differently?
6. Reselect "Full Ahead at Sea" to reset the ship with ME on.

7. Now turn both DG1 and DG2 OFF (no Auto or St-By Gen) and repeat to verify that the EG can pick up the Essential Load only.
8. Look on the Power Plant Generators tab to see that the EBB breaker is connected.

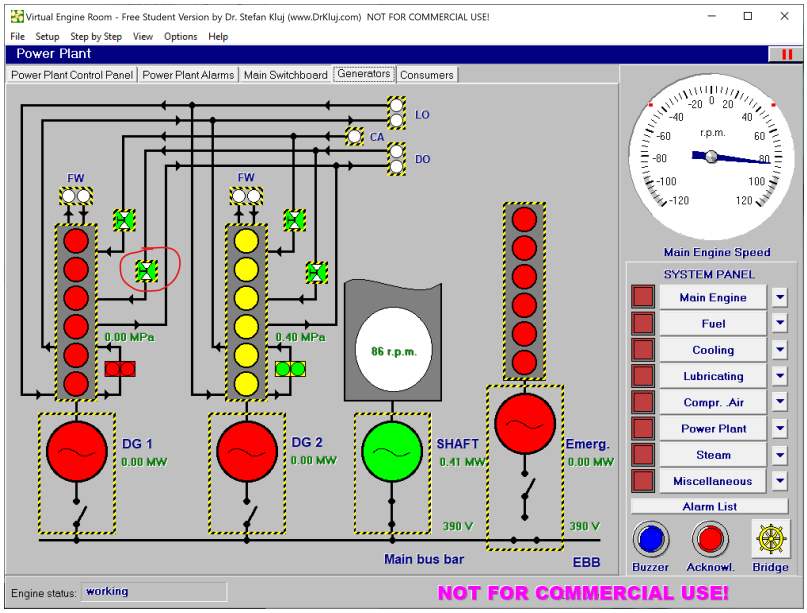


9. Is it possible to get one of the DG started with just the EG running? (go ahead and try)
10. Reselect "Full Ahead at Sea" to reset the ship with ME on.
11. Turn on DG1 manually and connect it to the Main bus using the Auto Synchro.



12. Check that both the SG and DG1 are connected on the Generators tab.
13. Repeat the engine slowing down test, what happens differently this time? When the RPM drops to around 60 and the SG disconnects, slowly raise the level to speed the engine back up to normal. Were you able to keep the engine running this time?
14. Then either reset the system or where you left off have DG1 running the main bus and disconnect the SG from the MBB using the Auto Sync OFF, make sure DG2 is still set in AUTO and selected as the ST-BY generator.

15. Then on the Power Plant, Generators tab close the Fuel Inlet valve to DG1 and observe what happens while DG2 comes on line.



16. Next repeat the above steps 13 & 14 but select the SG as the ST-BY generator before securing fuel to DG1, what is different here?
17. Watch the following video: https://www.youtube.com/watch?v=uVTyzsCFE6I
18. Restart the system, start DG1 manually then attempt to connect it to the Main Bus manually. You may have to select the Freq. Adjust + button until the Synchroscope starts moving in the clockwise direction, then connect the DG 1 breaker when it is near 11 O'Clock.
19. Note, there doesn't seem to be any manual way to shed the load from one Generator to another to safely manually remove a generator from the MBB, but let me know if you find one.
20. Use the Auto Sycron OFF button to remove the SG, then go back to the Generators tab to see its load moving over to DG1 before having its breaker open.
21. Play around some, think about ways that a sophisticated cyber attacker with knowledge of this ship's electrical system could wreak havoc. Try a few out and report in the google form.