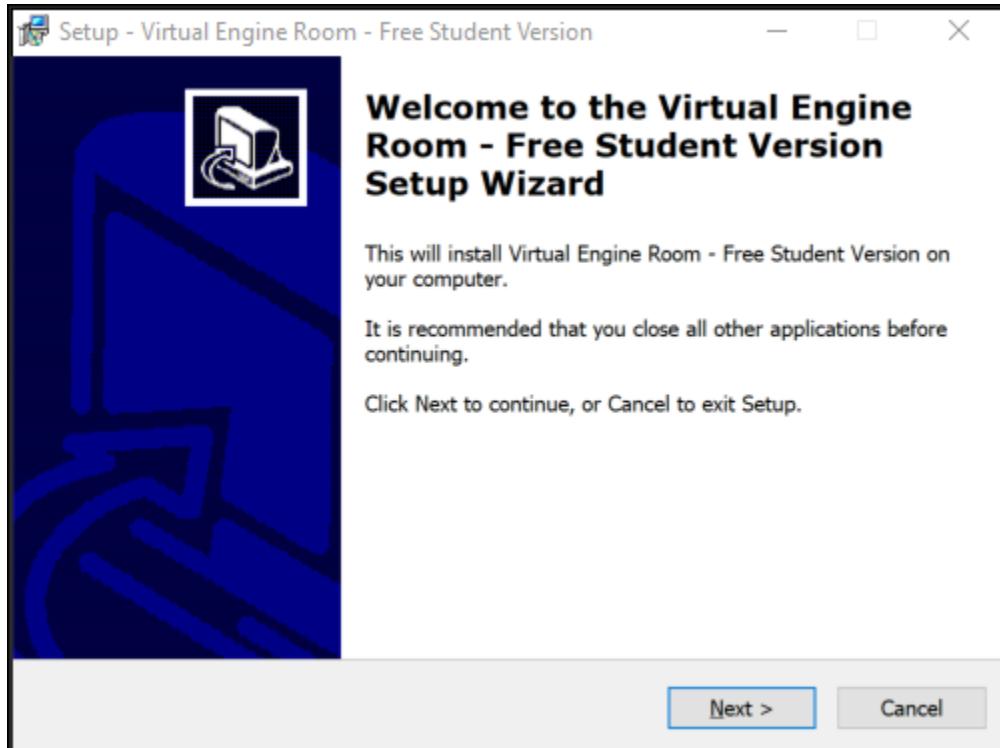


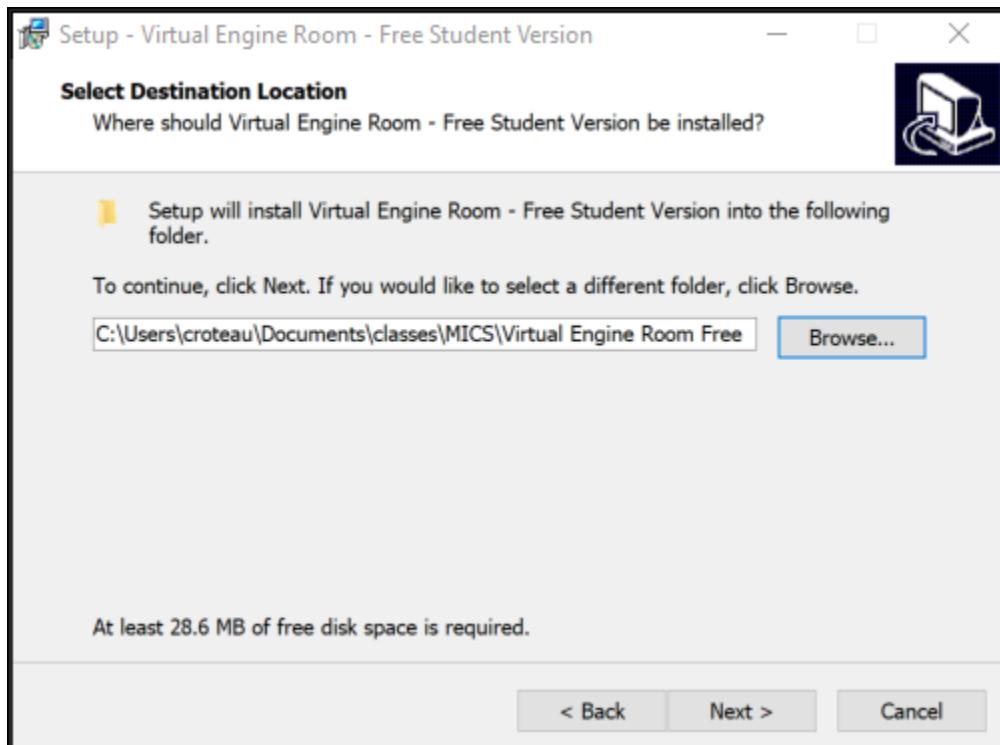
# Lab 1 Tutorial

v1 06 Jan 2023, CDR Brien Croteau, USNA Cyber Science Department

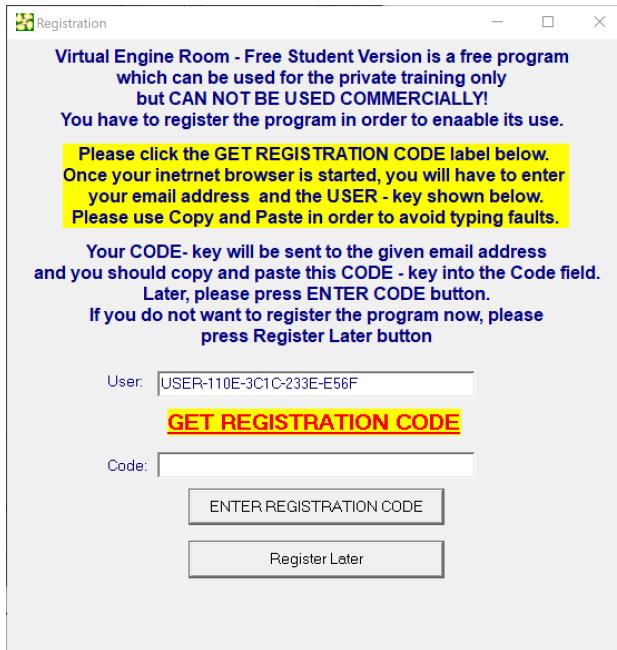
1. Go to <https://drkluj.com/simulators/free-student-version/> and download the install file [ver\\_free\\_install.zip](#)
2. Navigate to where you downloaded it expand it then run the Setup.exe application



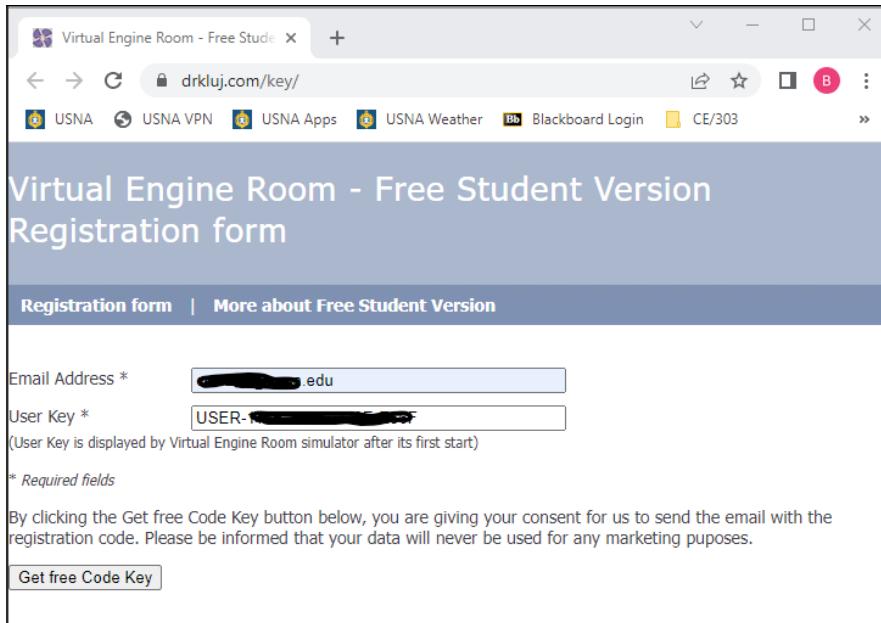
3. Accept the License Agreement, then Next after reading the install information
4. **IMPORTANT**, select Browse to select another folder besides the default and place it somewhere in your Users folder. If you don't then you may have an issue saving the key file where the program can see it.



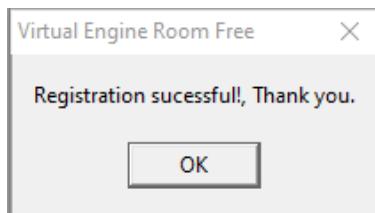
- Select Next and Next to make a shortcut, then finally Install
- After it runs you can click the box to launch the application
- When first running the program you will have to generate an enter a key from the developer's website



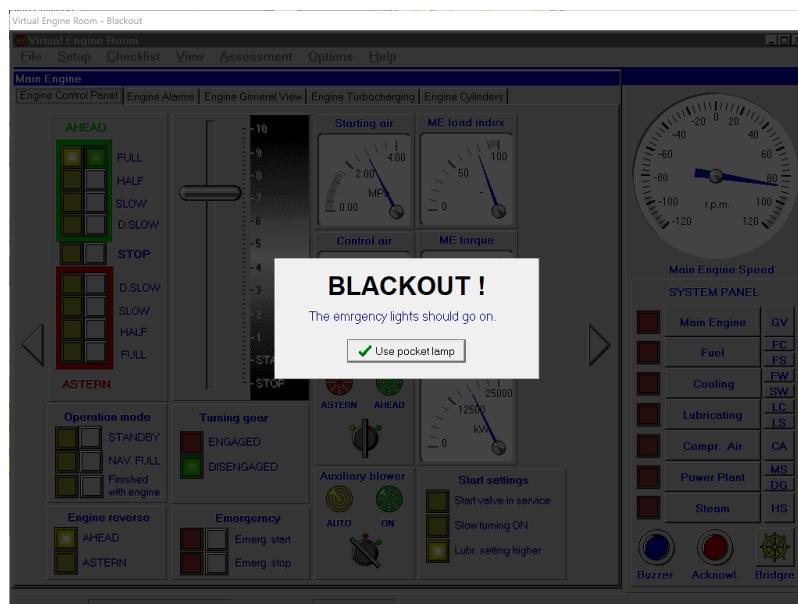
- Copy the USER string of numbers and click the [GET REGISTRATION CODE](#) link
- Type in your .edu email address and paste in the USER key from the program dialog



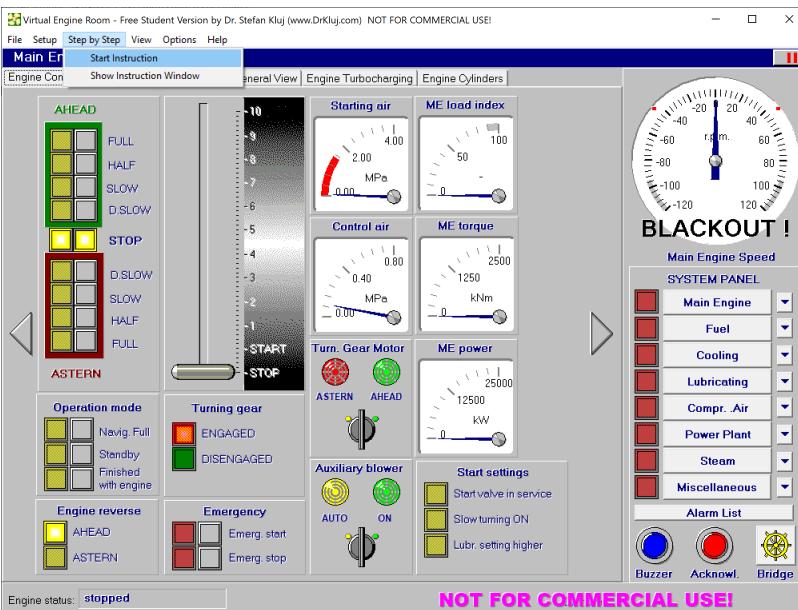
- It should generate a CODE key that you can copy and paste back into the program, then click ENTER REGISTRATION CODE, hopefully seeing



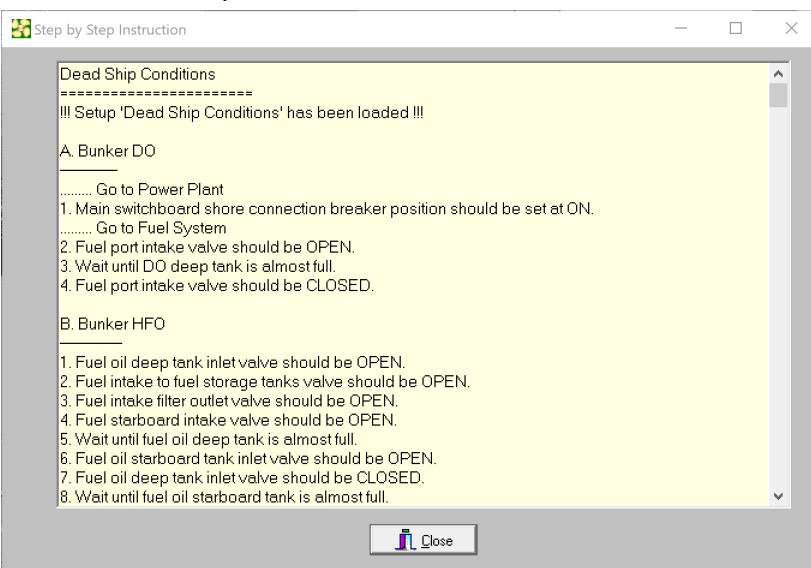
- The program will default the ship into a completely cold state called Dead Ship where no power is getting to the ship. Click the Use Pocket Lamp button to get to the main interface.



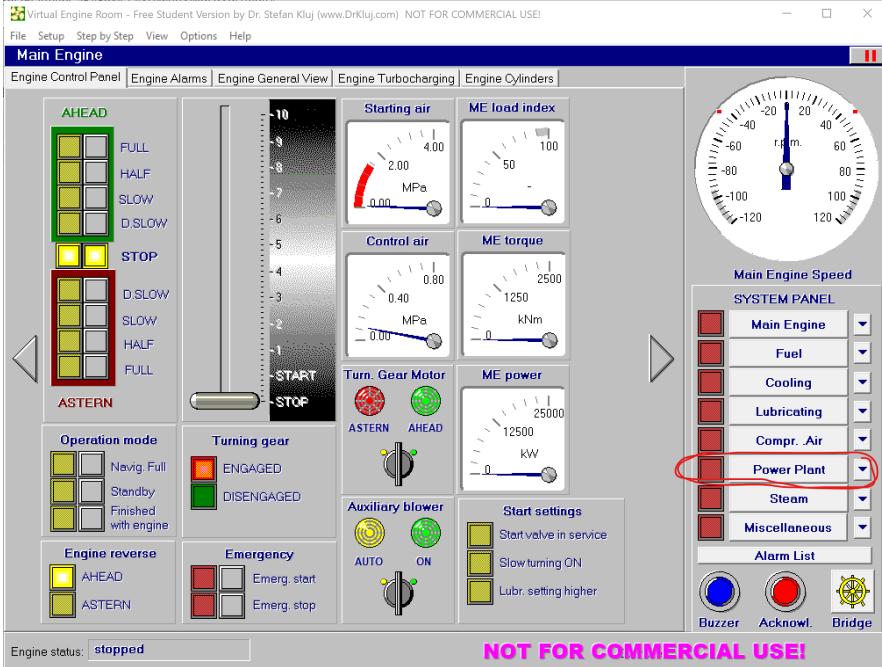
12. Once there, up in the menu bar select Step by Step then Start Instruction.



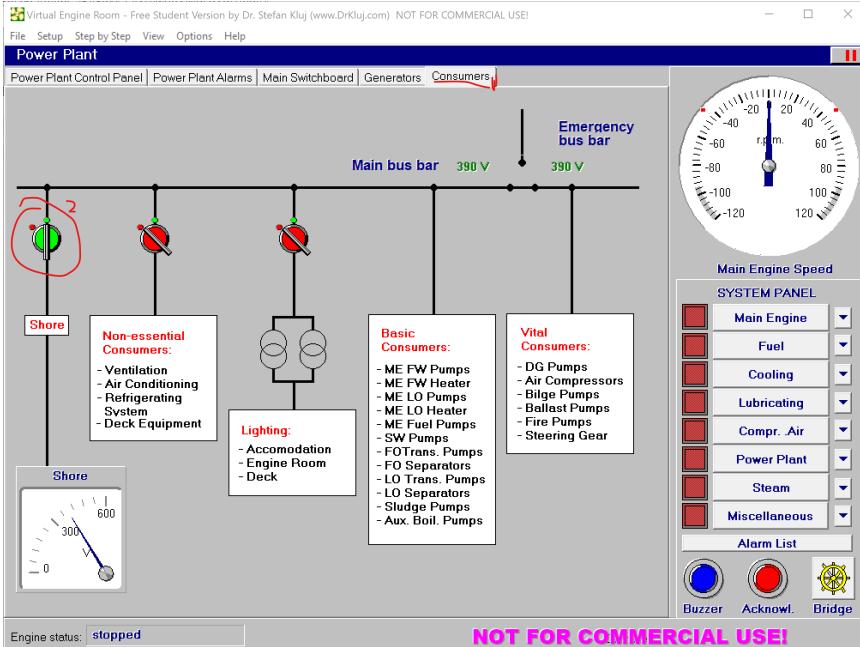
13. This will open a checklist in another window, then follow the steps as outlined below.



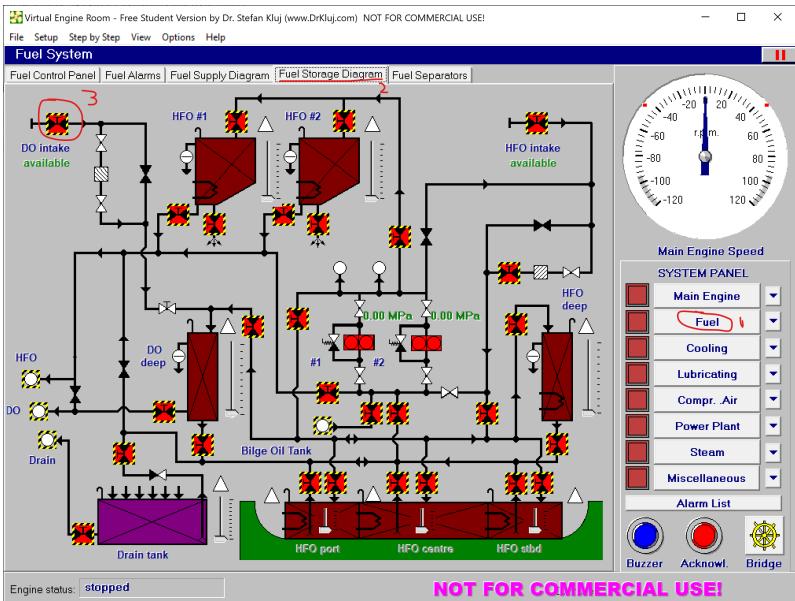
14. You can navigate to the main pages of the Virtual Engine Room using the stack of buttons on the right side of the interface labeled System Panel. Click the Power Plant button to take you to that portion.



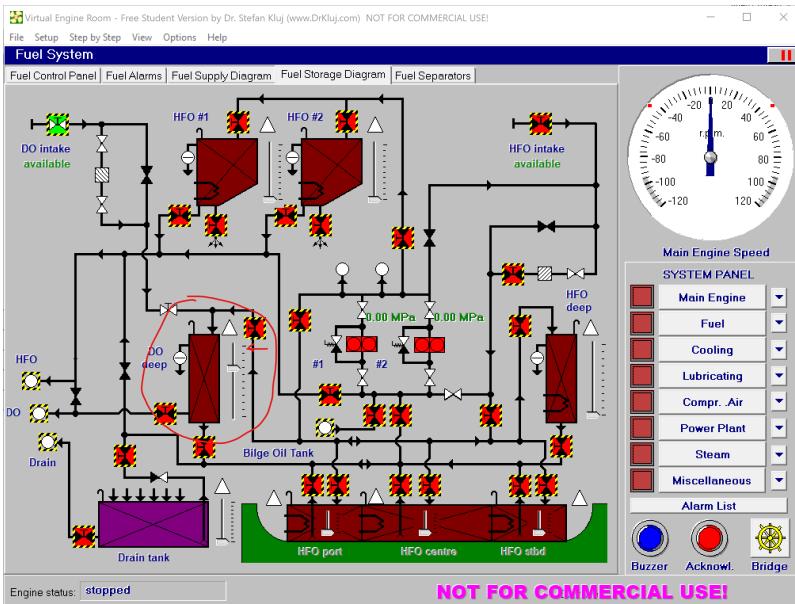
15. Once there, (1) click on the Consumers tab at the top, then (2) click the leftmost switch to attach shore power to complete step A.1, you should see the Blackout indicator go away.



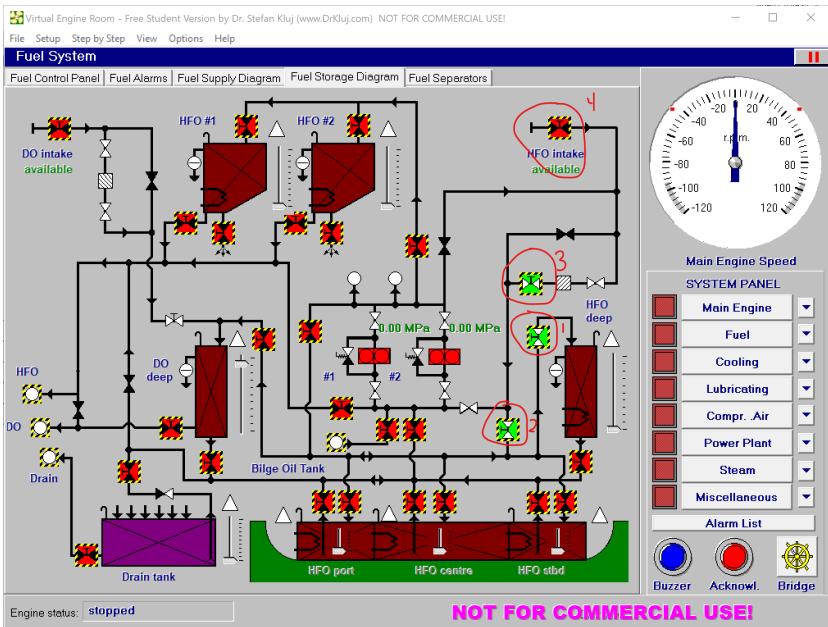
16. Then go to the (1) Fuel system, click on the (2) Fuel Storage Diagram and hover over the valve (3) in the upper left corner of the screen, which should be Port Intake Value, click on it to open the value which should turn it green.



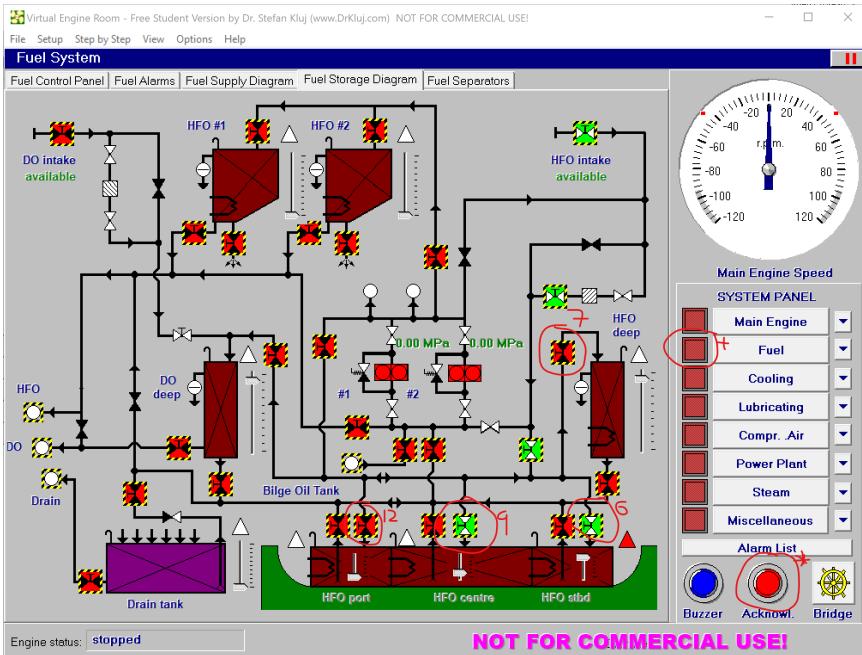
17. Once it is open you should see the DO (diesel oil) deep tank level start to rise, close the DO intake value when it reaches near the top of the tank.



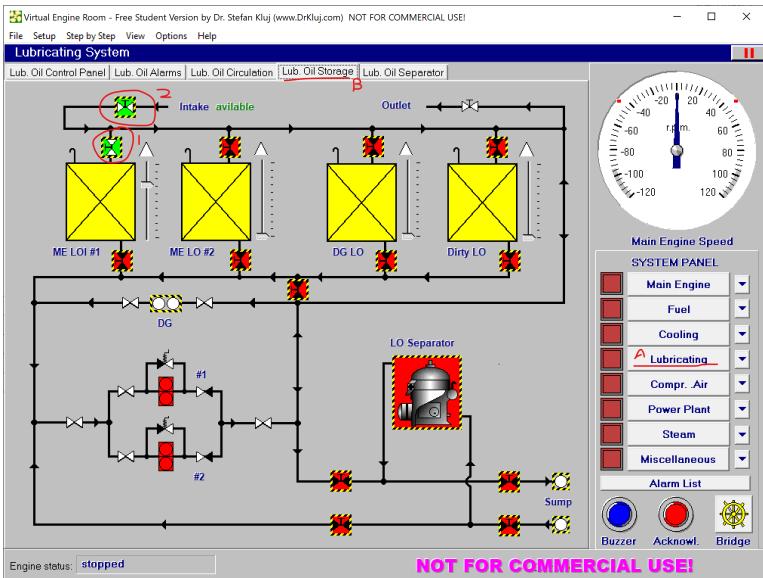
18. Next is Part B bunkering (which is what ship folks call filling up tanks) [heavy fuel oil](#) (HFO). First open the (1) inlet valve to the HFO deep tank, then (2) the value to the storage tanks, next the valve (3) at the output of the fuel filter, then open the (4) starboard HFO intake value which should start filling tanks.



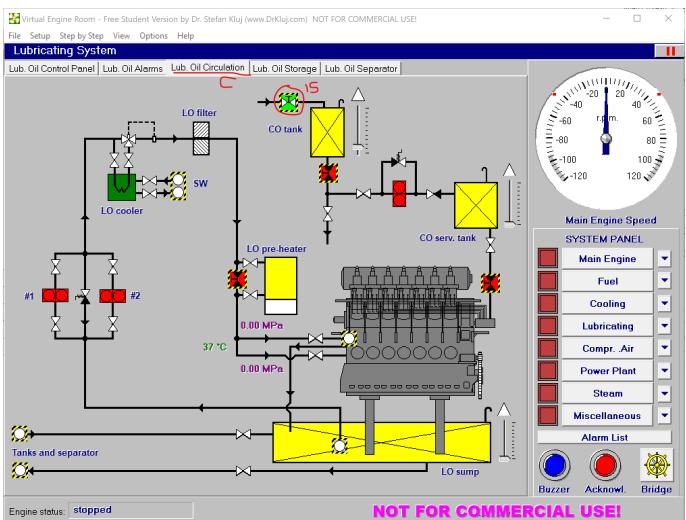
19. When the HFO deep tank is almost full, open the (6) inlet valve for the Starboard tank in the lower right portion of the tank, then close the (7) HFO deep tank inlet valve. Then repeat in turn for the (9) Center and (12) Port tanks. **If you happen to let any tank get too full, an alarm will go off indicated with a flashing light next to Fuel (+) and a buzzer sound. You can make the buzzing stop by clicking the Red Acknowl. button (\*) in the lower right corner of the display several times.**



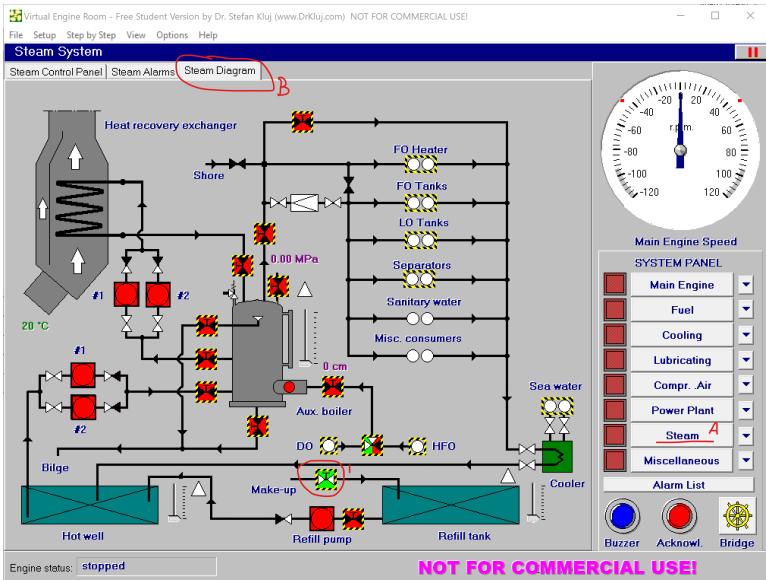
20. After all the storage tanks are nearly full, close all the indicated values as indicated in steps 15-18.
21. Part C has you bunkering the lubrication oil tanks. Start by moving to the (A) Lubricating system, then selecting the (B) Lub. Oil Storage tab. Next (1) open the ME Lubricating Oil (LO) #1 Refilling Valve, then (2) the Lube Oil system valve and the leftmost tank should start to fill. Similar to prior steps, fill the #2 tank as well.



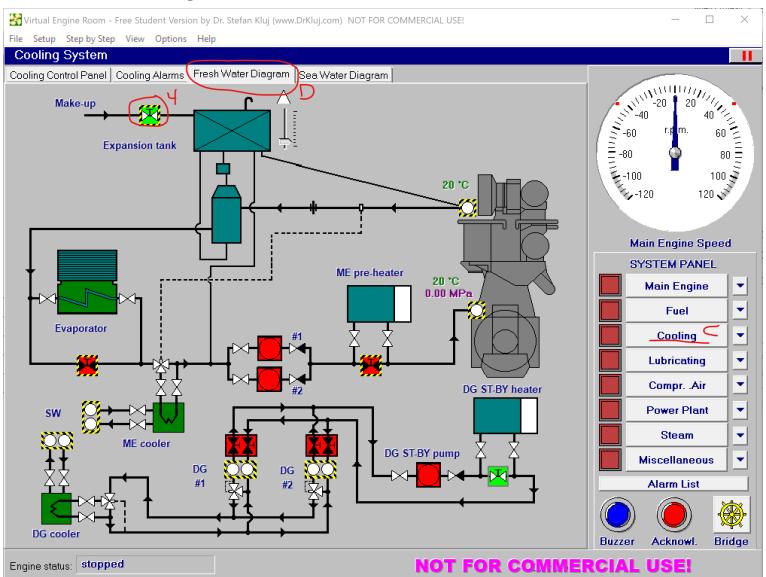
22. The checklist here is a little unclear since there is only a single LO intake valve not separate Main Engine (ME) and Diesel Generator (DG) ones as indicated in the checklist, you can skip steps 7 and 10 and just fill the DG LO tank in turn after #2. After these three tanks are nearly full, close all those valves.
23. Then move to the (C) Lub. Oil Circulation tab, and open (15) the ME Cylinder Oil (CO) Refilling valve to fill that tank nearly full, then (17) close to stop.



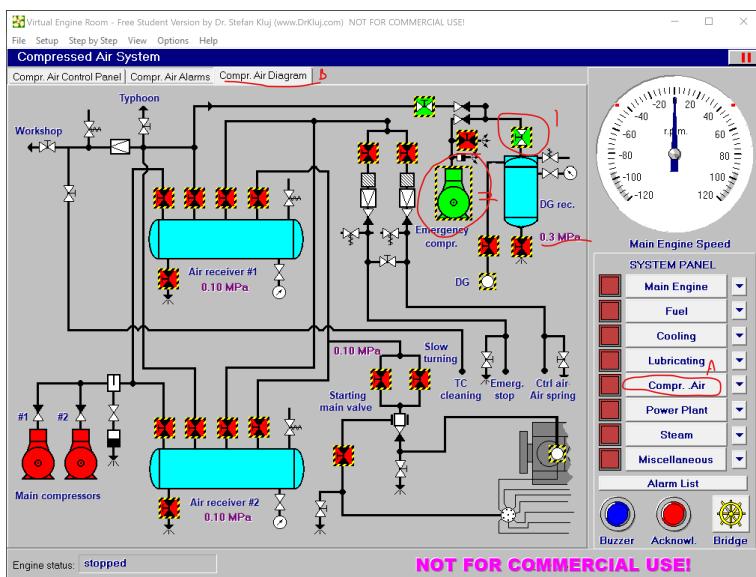
24. Part D where you will fill the Fresh Water (FW) tanks. Start by heading to the (A) Steam system, then select the (B) Steam Diagram tab. Then open the (1) Hot Well Refilling valve and wait until the Refill Tank is nearly full.



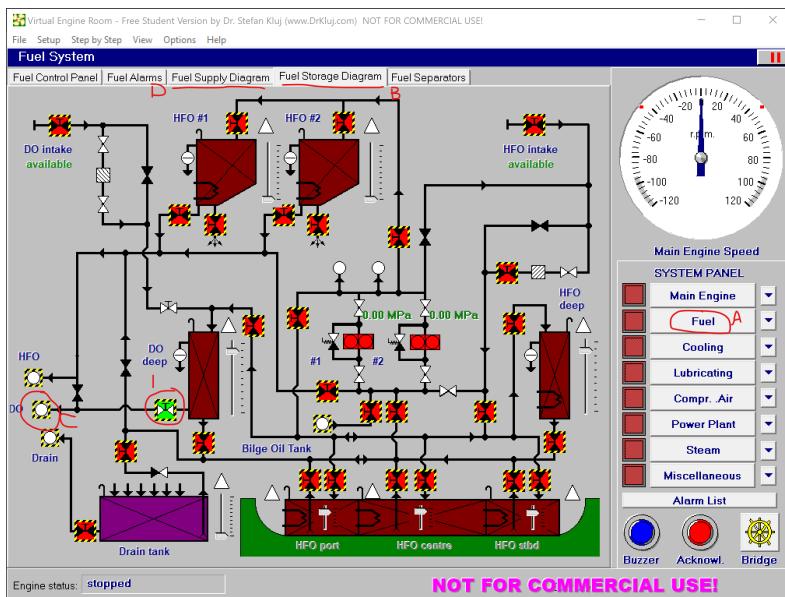
25. Next head to the (C) Cooling system, then the (D) Fresh Water Diagram tab. Open the (4) FW Gravity Refilling valve, and close it when the top tank is nearly full.



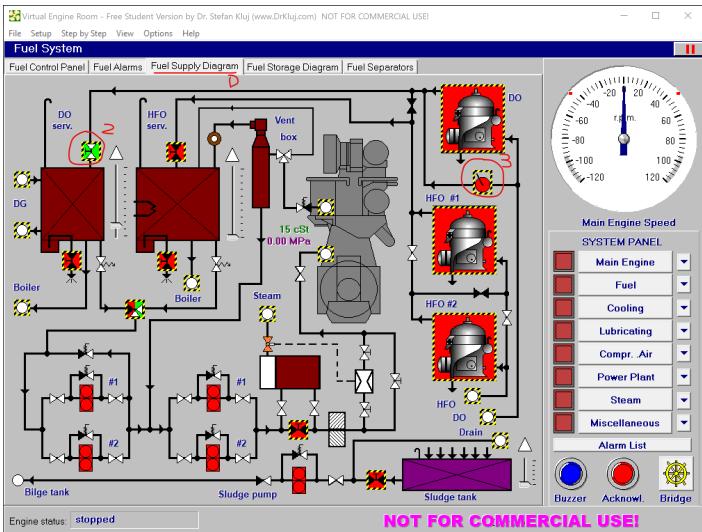
26. Part E covers filling the air tank to start the Diesel Generator. Go to the (A) Compressed Air system, then select the Compr. Air Diagram tab at the top. Next open the (1) DG start air Refilling valve, then start the (2) Emergency compressor to start filling the DG Rec. air tank. It has a digital indicator to the right of the tank, wait until it reads higher than 2.5 MPa.



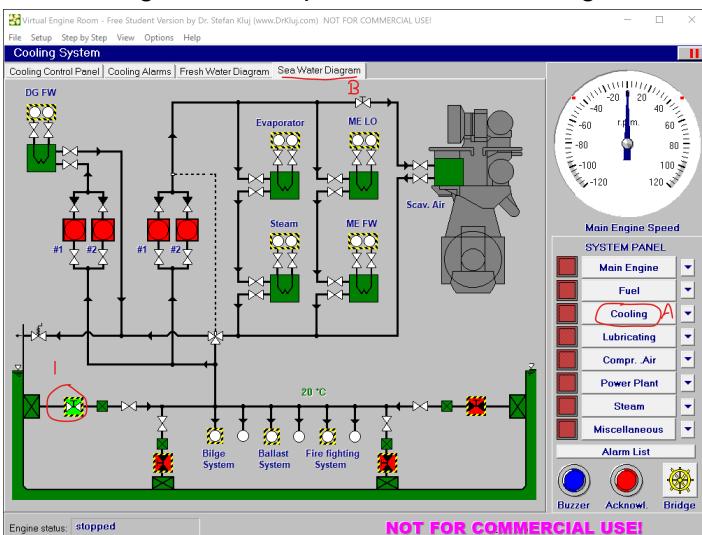
27. Part F will transfer Diesel fuel from the DO deep tank to the DO service tank. Go to the (A) Fuel system, and then the (B) Fuel Storage Diagram tab. First open the DO deep tank Purifier suction value open, then either click the (C) hashed connection box to the left of that value labeled "DO" or the (D) Fuel Supply Diagram tab.



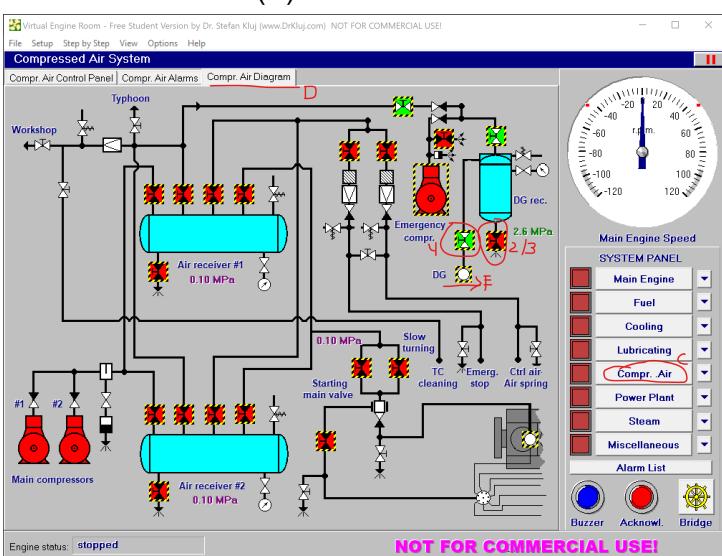
28. Once on the (D) Fuel Supply Diagram tab, open the (2) DO Service Tank Refill valve, then click the (3) DO hand pump several times until the DO service tank is nearly full. Leave the two other valves open.



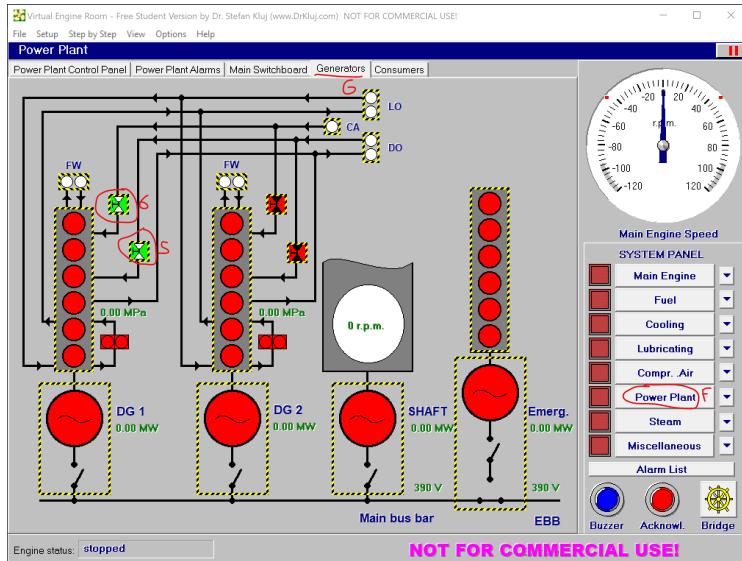
29. Now is time to start the first machine, DG #1. Start in the Cooling system and select the Sea Water Diagram, then open the Port Side Kingston valve.



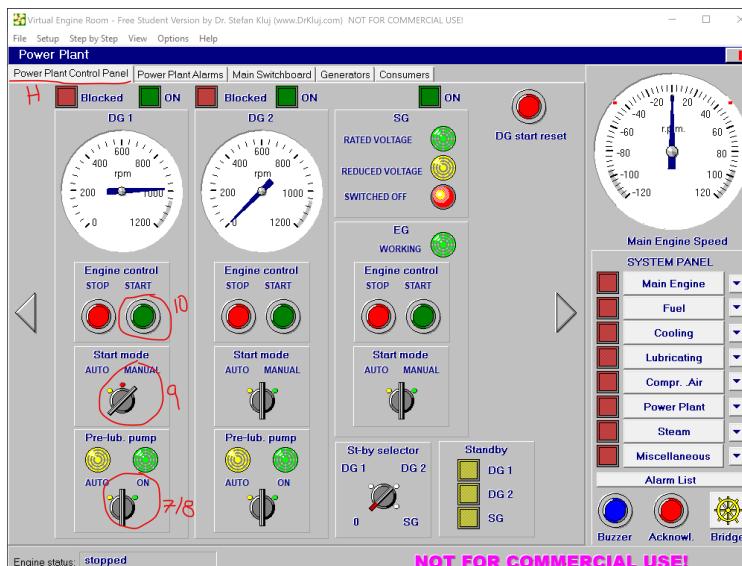
30. Go the (C) Compressed Air system and the (D) Compr. Air Diagram tab, and briefly cycle the (2/3) DG Start air drain valve. Then open the (4) DG Start Air Receiver Main Delivery valve. Then you can take the shortcut (E) labeled "DG" to head to the Power Plant system.



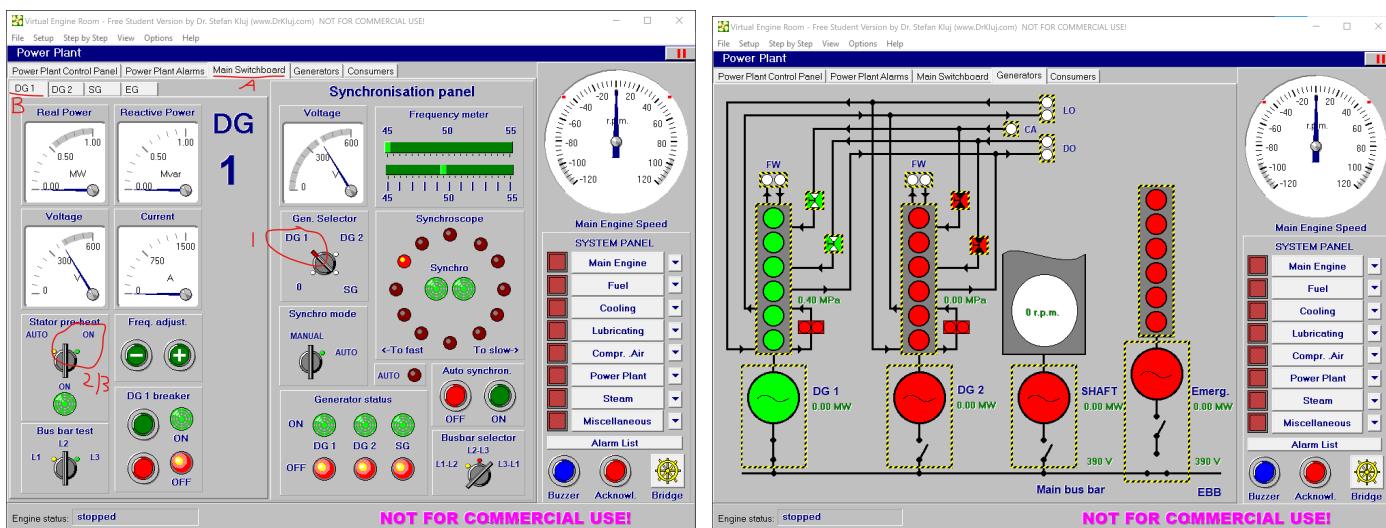
31. In the (F) Power Plant system, start on the (G) Generators tab and open the (5) DG1 start air inlet valve and the (6) DG1 fuel inlet valve.



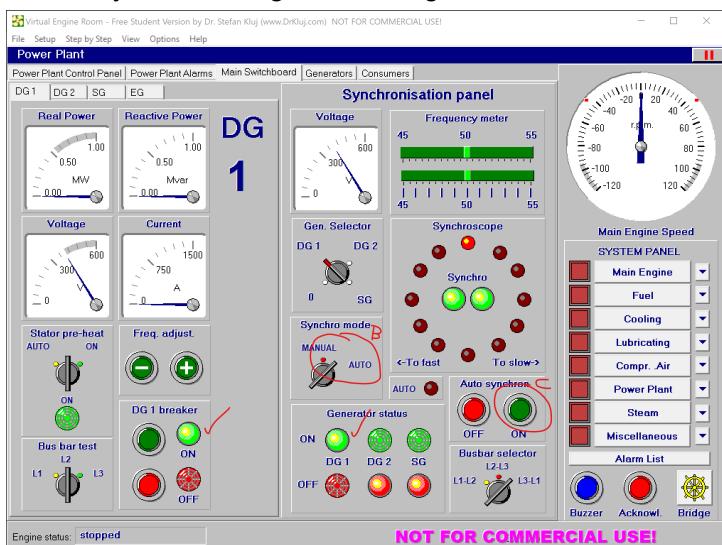
32. Then move to the (H) Power Plant Control Panel tab. and turn on the (7/8) DG1 Pre-lubricating pump switch for a few seconds then turn off. Next move the DG1 Start mode switch to Manual. Then click on the green start button right above until the RPM gauge starts to move.



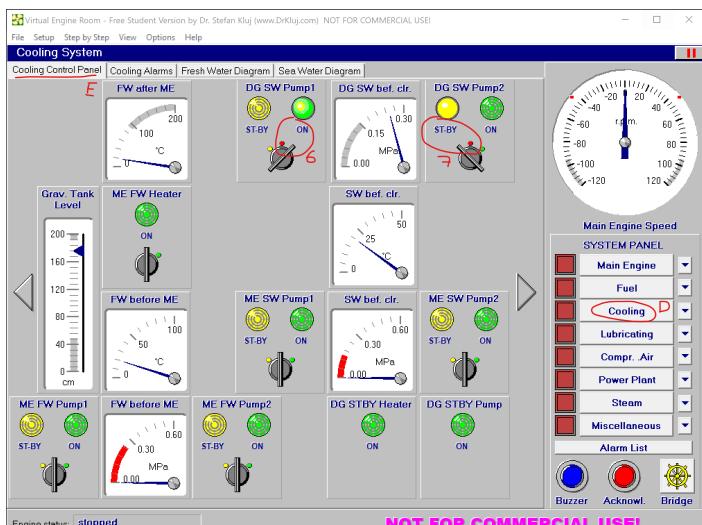
33. Section H will have you connect the DG to the ship's electrical system to take the main load. Move to the (A) Main Switchboard tab and make sure you have the (B) DG1 subtab selected. Select DG1 on the (1) Gen. Selector knob. Then, briefly cycle the (2/3) Stator pre-heat switch on and off. Next go to the Consumers tab and turn off the (4) far left breaker to remove Shore Power (you will briefly get the Blackout alert and some alarms). Then return back to the (A) Main Switchboard tab and press the (5) green button under DG 1 breaker, and the green light next to it should come on. If you go to the Generators tab you should see DG1 connected to the Main Bus.



34. If that doesn't work, you can use the Auto synchronizer to match the DG1 AC power to the ship's load before attaching it. Move the (B) Synchro mode switch to auto, then click and hold the (C) Auto synchron. ON green button until the red LEDs in the circle above stop moving and the DG1 shows on.

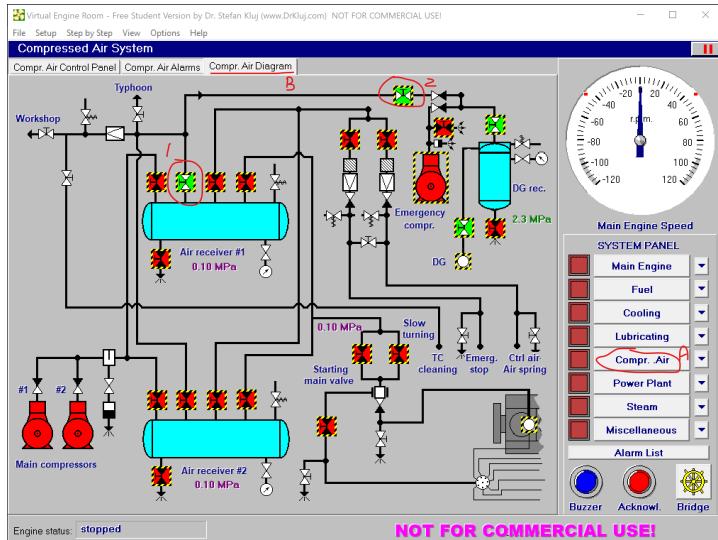


35. Finally head to the (D) Cooling system on the Cooling Control Panel tab and turn the (6) DG SW Pump 1 to ON, and the (7) DG SW Pump 2 to STBY.

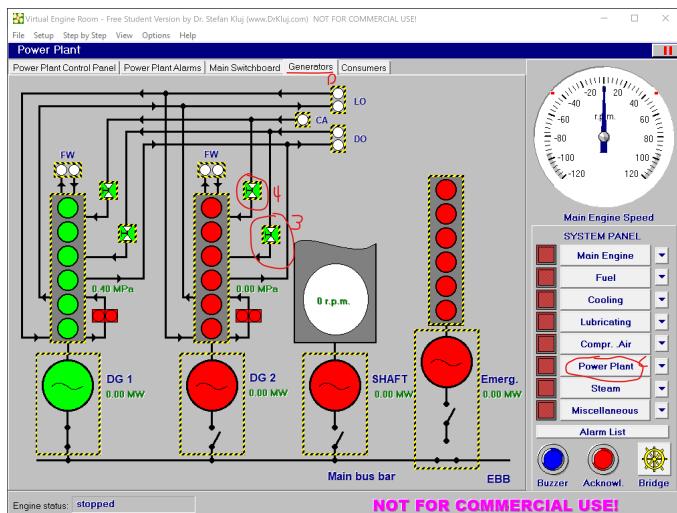


36. Section I will prepare DG2 so that it can be ready to take over the electrical load in case something happens to DG1. In the (A) Compressed Air system, on the (B) Compr. Air Diagram tab, open the (1)

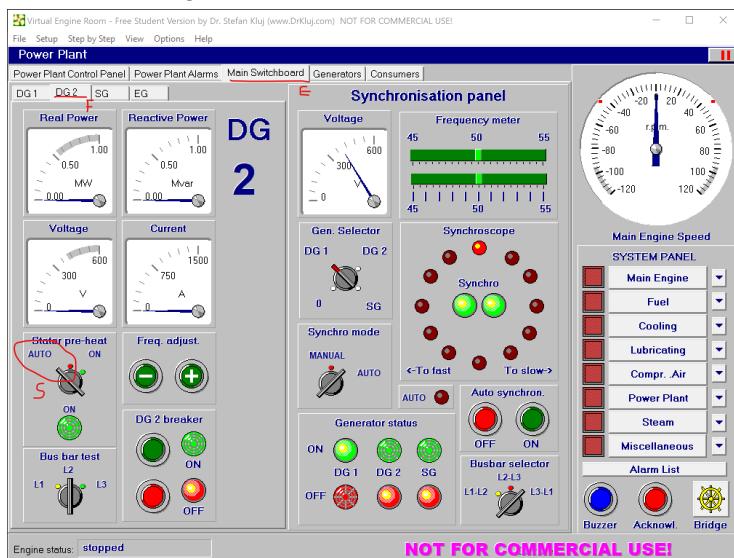
Start Air Receiver #1 Auxiliary air valve. The (2) DG Star Air system Refilling valve should already be open from the previous steps.



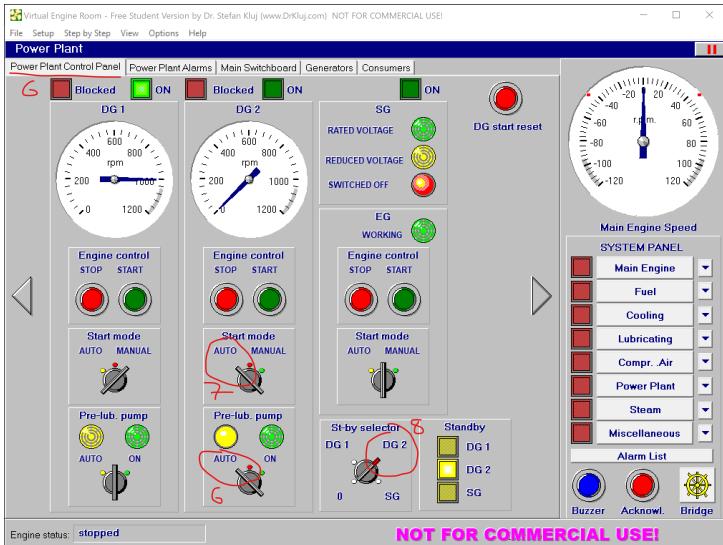
37. Go to the (C) Power Plant system, and on the (D) Generators tab open the (3) DG2 fuel inlet value and the (4) DG2 start air inlet valve.



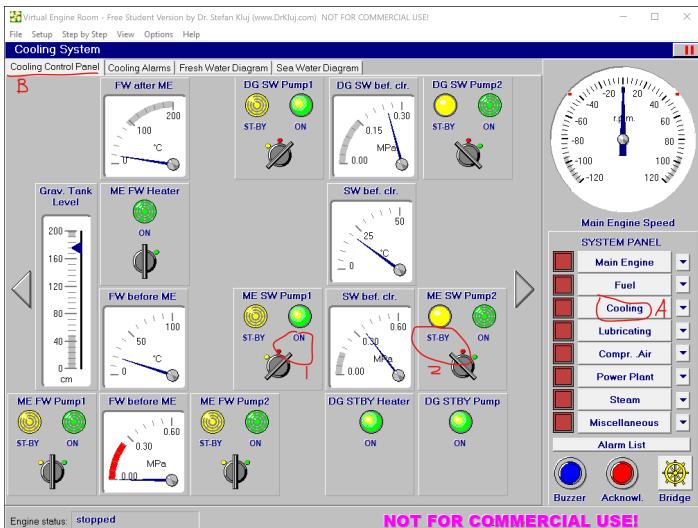
38. Next on the (E) Main Switchboard tab, select the (F) DG2 subtab and move the (5) DG2 Stator windings pre-heat switch to AUTO, note that the checklist says STANDBY.



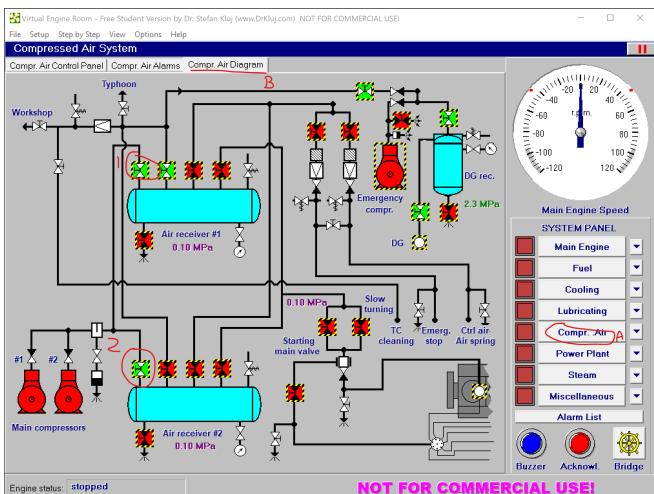
39. Then on the (G) Power Plant Control Panel tab, move both the (6) DG2 Pre-lube pump switch and the (7) DG2 Start mode switch to AUTO. Finally move the rotary (8) St-by selector switch to DG2.



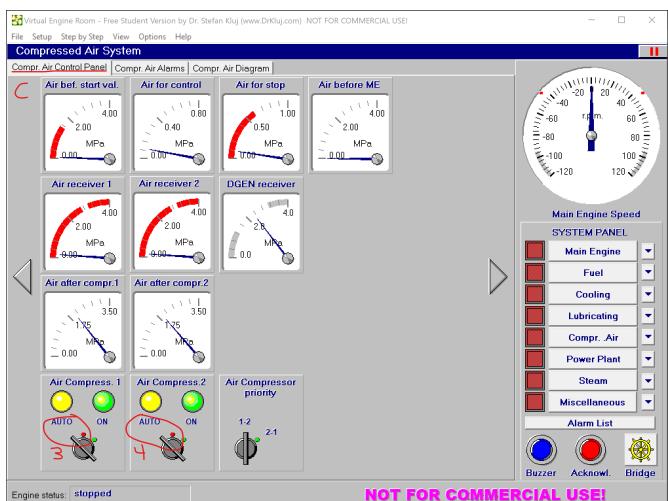
40. Section J will start the Main Engine (ME) Salt Water (SW) cooling pump, in the (A) Cooling system, on the (B) Cooling Control Panel, turn the (1) ME SW Pump1 to ON and the (2) ME SW Pump2 to STBY.



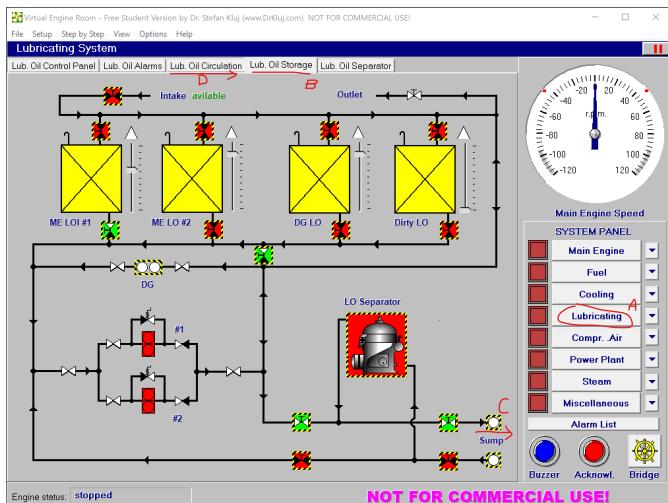
41. Then for Section K we need to start filling the ME Start Air receiver tanks. In the Compr. Air system on the Comr. Air Diagram tab, open both the (1/2) Start Air Refilling valves.



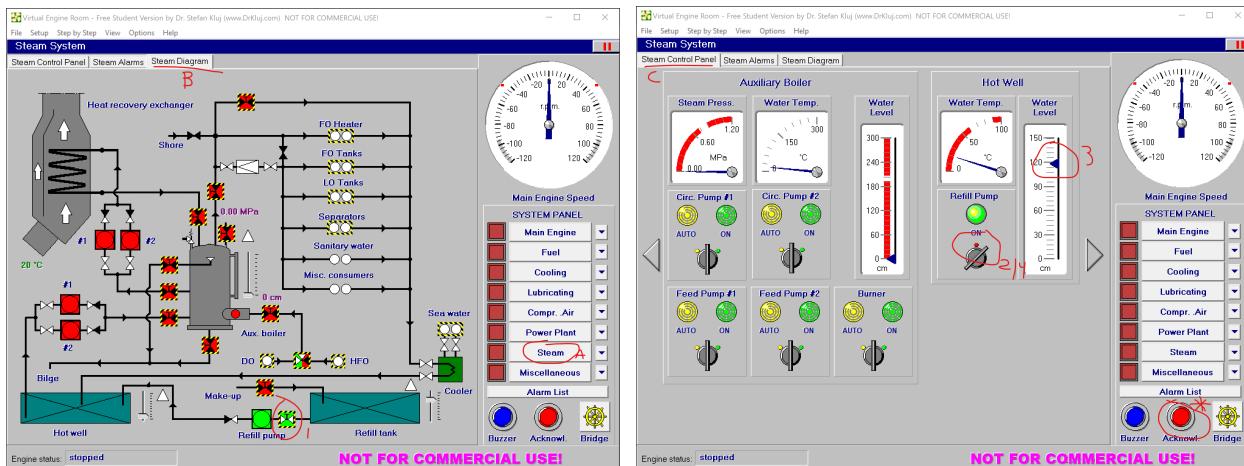
42. Then on the (C) Compr. Air Control Panel tab, turn both (3/4) Air Compress. 1 & 2 switches to AUTO. You should see both tanks filling on the diagram tab.



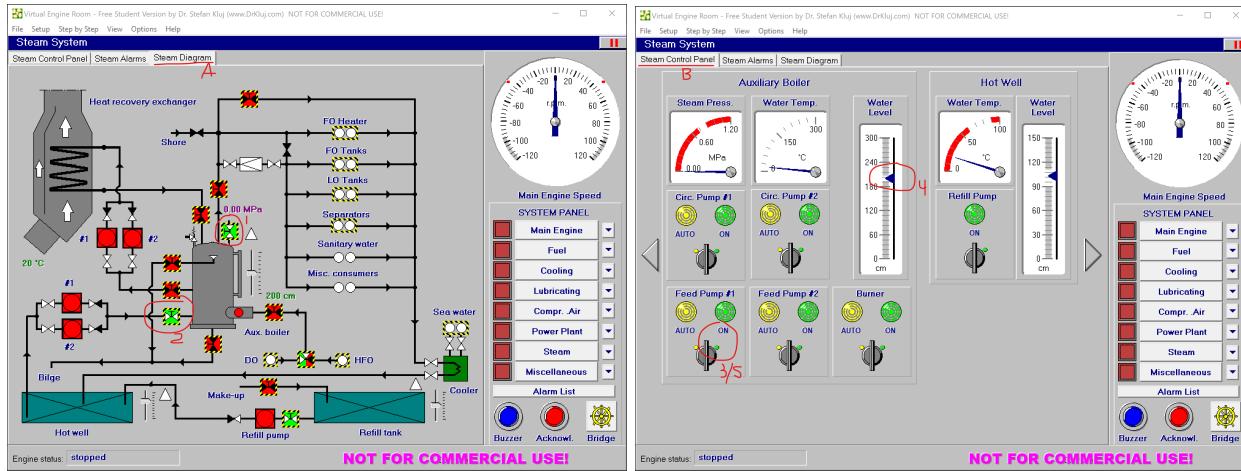
43. Next in Section L, you will transfer lube oil into the ME. In the Lubricating system on the (B) Lub. Oil Storage tab, find the four values indicated in steps 1-4 of the checklist and open them. Then go to the Sump tank wither via (C) the "Sump" connector or by selecting the (D) Lub. Oil Circulation tab. Wait until the ME LO sup tank at the bottom of that screen is about half full, then close the three valves as indicated in steps 6-8.



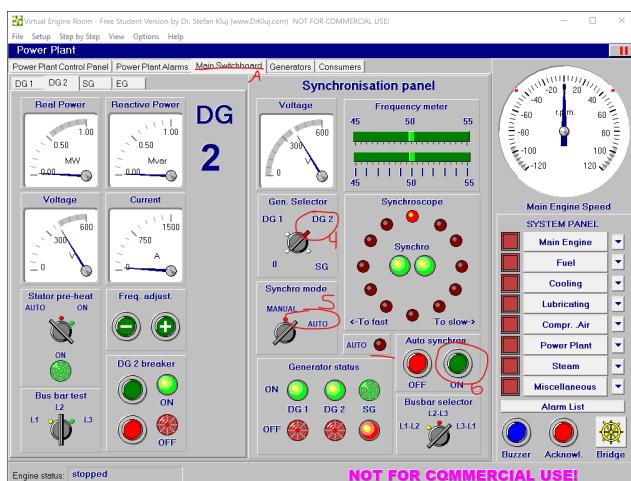
44. Next in Section M, fill the Boiler's Hot well in the (A) Steam system on the (B) Steam Diagram tab, first opening the (1) Hot well refilling pump suction valve. Then go the (C) Steam Control Panel tab and turn on the (2) Hot Well Refill Pump switch and you can monitor the (3) Water Level there and wait until it triggers the high level alarm set at > 110 cm (target 130 cm) before securing the (4) Refill Pump and (\*) acknowledging the alarm.



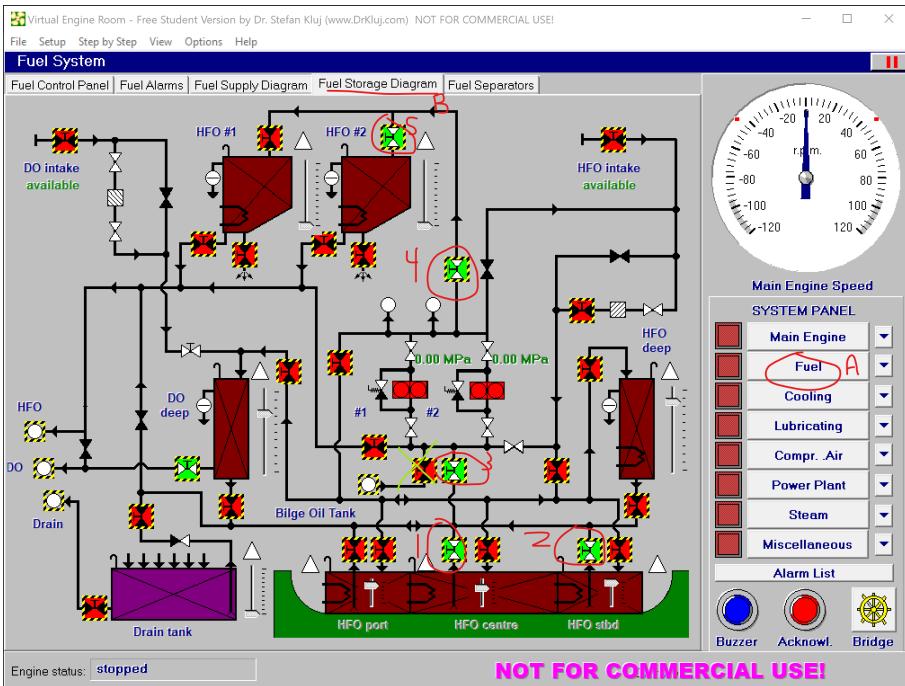
45. Next Section N will fill the Auxiliary Boiler. Start on the (A) Steam Diagram tab and open the (1) Aux. Boiler Venting valve, and the (2) Aux. Boiler Feed Valve #1. Then move over to the (B) Steam Control Panel tab and turn on the (3) Aux. Boiler Feed Pump #1 switch until the (4) Water Level reaches about 200 cm, then secure the (5) feed pump. You should also notice that the Hot Well Water Level should return to the normal range.



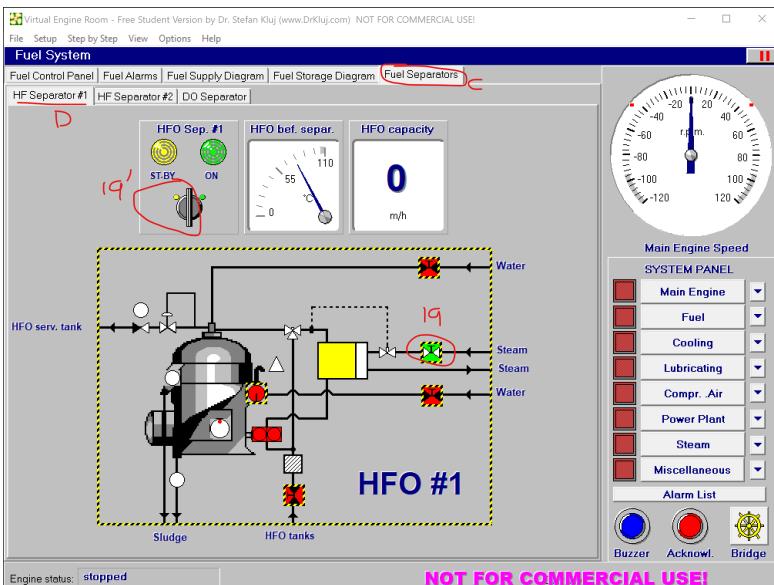
46. Section O will start the Aux Boiler, on the Diagram tab open the (1) fuel inlet valve to the right of the Aux boiler tank, then back on the Control Panel tab, put the (2) Feed Pump #1 switch and the Aux. Boiler Burner switch to AUTO. It will take a few seconds to see the (4) Steam Press needle move, but after it does go back to the Diagram tab and close the (5) Aux. Boiler Venting valve. Once the pressure reaches normal range around 0.8 MPa, then open the (7) Aux Boiler Main Steam valve.
47. Next in Section P, it will start up and make sure DG2 can be synchronized. In the Power Plant system on the Control Panel tab, turn off the (1) DG2 Pre-lub. pump (up neutral position), and set the DG2 Start mode switch to MANUAL. Then start DG2 with the (3) green button and the RPM should settle at 1000.
48. Then go to the (A) Main Switchboard tab and turn the (synchron) Gen. Selector (4) rotary switch to DG2 and the (5) Synchro mode switch to AUTO. Then press and hold the (6) green Auto synchro. button until the small red LED to the left of the buttons blinks and you should see the two green LEDs in the middle of the circle come on in a few seconds.



49. Section Q will move the Heavy Fuel Oil (HFO) into the tanks to feed the ME. In the (A) Fuel system on the (B) Fuel Storage Diagram tab, open both the (1) center and (2) starboard tank suction valves. Next the (3) Fuel Transfer Pumps suction from Fuel Storage tanks valve should be open, but note that it appears that the tooltip for this valve is swapped with the Suction from Oil Collection valve that is just to the left. Then open the (4) Fuel Transfer Pumps to Fuel Settling tank value, then the (5) HFO #2 Settling Tank inlet value.

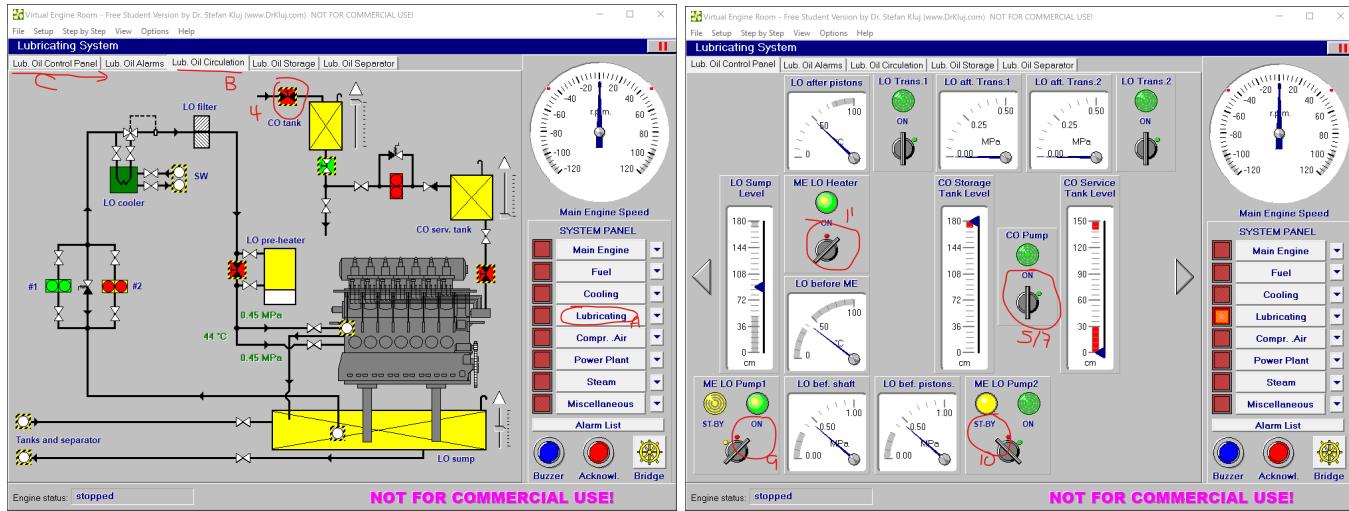


50. Then go to the Fuel Control Panel tab and turn on the (6) Trans. Pump #1 switch, and go back to the Diagram tab and you should see the right HFO #2 tank start to fill. Give it a head start, then also open the (7) HFO #1 inlet valve to start to fill that tank. Close the (8) #2 inlet when it is nearly full, and then when the #1 is nearly full go back to the Control Panel tab and secure the (11) Transfer Pump, then close the HFO #1 inlet valve as well as the other indicated valves in steps 13-16.
51. Next open the (17) Fuel Oil Settling Tank No. 1 Suction valve, then on the Fuel Supply tab open the (18) HFO Serv. refill valve on the top of that tank.
52. Then go to the (C) Fuel Separators tab and select the (D) HF Separator #1 subtab. Open the (19) Fuel Oil Purifier No. heating steam inlet valve, and repeat for (20) HF Separator #2. Then turn both HFO Sep. (19') #1 and (20') #2 switches to ST-BY. Note the checklist repeats steps 19 and 20 here.



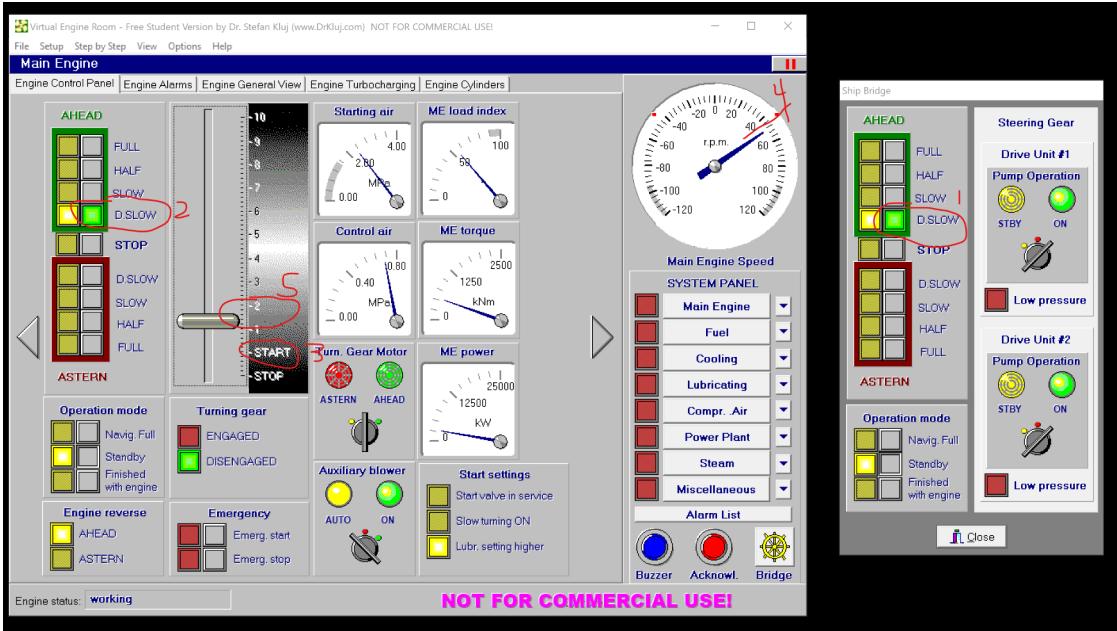
53. Then go to the Fuel Supply Diagram tab and you should see the HFO serv. tank level rising, and it should stop on its own when reaching near the top. Then go to the Fuel Control Panel tab and turn the (22) Fuel Supp. Pump1 ON (in the upper left hand corner) and the (23) #2 supply pump to ST-BY. Then in the lower portion of that panel turn the (25) Fuel Circ. Pump1 ON and the (26) #2 Circ. Pump to ST-BY.

54. Section R will get the Main Engine (ME) cooling the lube systems ready. Start in the Cooling system on the Control Panel tab, in the lower left hand portion turn the (1) ME FW Pump1 switch ON and the (2) ME FW Pump2 to ST-BY. Then the ME FW Heater switch (just above) should also be ON.
55. Then go to the (A) Lubricating system and start on the (B) Lub. Oil Circulation tab and open the (4) ME Cyn Oil (CO) tank Refilling valve, which should start filling the CO tank. Go over to the Lub. Oil Control Panel tab and turn the (5) CO Pump switch ON. Go back to the Circulation tab and watch the CO tank level, **note that it is not indicated on the checklist but you should also secure the (4) Refill valve** and then also secure the CO Pump back on the Control Panel tab. Then also on the Control Panel tab turn the (9) ME LO Pump1 ON, the ME LO Pump2 to ST-BY, and the (11) MO LE Heater switch ON.

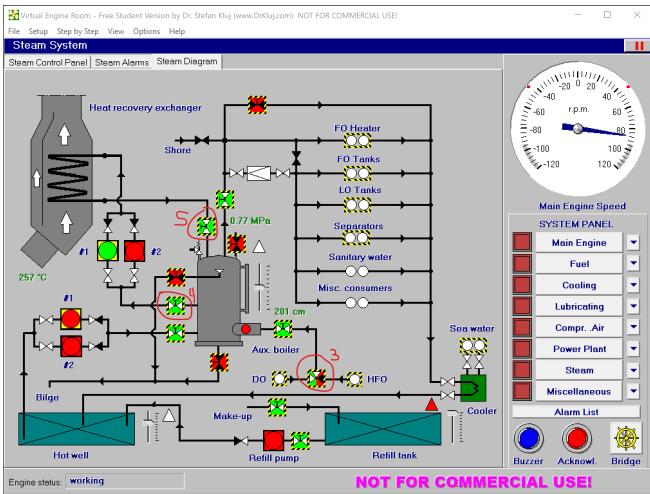


56. Section S readies the compressed air tank in order to start the ME. In the Compr. Air system on the Diagram tab, briefly cycle both drain valves IAW steps 1-4. Then open the values over each tank as directed in steps 5-10. The (11) DG Air Start Refilling valve should already be open. Then the (12) Emergency Stop Air Delivery Valve and the (13) Control Air Delivery valve, located just to the right of the #1 tank, should both be open. The final valve to open is the (14) Air Distributor Inlet valve, which is just the right of tank #2.
57. Then we are ready to start the Main Engine. In order to start the engines both the Bridge and Engine Room need to indicate something other than STOP. So start Section T by opening the Bridge dialog by clicking on the wheel in the lower right corner of the display. Then click on the (1) middle tile in the lower left corner that indicated Standby Operation Mode to notify the engine room personnel to start the engine. Leave the window open as you will come back here a few more times. You also have to select the (2) same mode in the Main Engine system on the Control Panel tab.
58. Next move over the Engine General View tab and move the (3) blue Lubricator settle handle to the Higher position. then open all seven (6-12) ME indicator valves on the top of the cylinders. Return to the Control Panel tab and move the (13) Turn. Gear Motor switch to ASTERN briefly then (14) return to OFF. Then go back to the General View tab click on the hashed box on the lower right corner of the engine diagram to (15) DISENGAGE the ME Turning gear, which you can check on the Control Panel.
59. First you will purge the air start lines. Return to the Bridge Dialog and click the (18) button next to D. SLOW. Then on the Main Engine Control panel also click on D. SLOW so that both sides of the EOT show AHEAD. Then Briefly move the (19) T-Bar control handle into the first detent of START before returning to (20) STOP. Then put both the Bridge and ME Telegraph to STOP (21-22). Then go to the Engine General View and close all the ME indicators valves, steps (23-29).
60. Go to the Compr. Air system on the Diagram tab and open the (30) Slow Turning Air Valve. then Return to the ME Control Panel and set the (31) Auxiliary blower switch to AUTO.
61. Then in the Miscellaneous system on the Steering Gear tab, turn on both (32-33) Drive Unit Supply Steering Gear Power Switches, then turn both (34-35) of the Pump Control Mode switches to REMOTE. On the Bridge, turn ON both Steering Gear Drive Units via their Operation Mode switches.

62. Now we are ready to start the Main Engine. Reselect D. SLOW on both the (1) Bridge and (2) Engine Telegraph. then you can move the (3) Control Lever to START the and the Main Engine Speed tachometer should start to move. Once RPM is above 40, then you can advance the Control Lever to above 1.5.



63. Then we can crank the engine faster by first selecting AHEAD FULL on the bridge and Engine's Telegraph, then moving the (3) Control Level to 5.5 which should result in about 70 RPM.
64. Then for Section X, on the Bridge select the (1) Navig. Full Operation Mode and do the same on the (2) Engine Control Panel display. On the Engine General View tab, lower the (3) Lubricator setting handle back down to Normal.
65. Then go to the Power Plant system to ready the Shaft Generator (SG) to take the load from the DGs. On the Main Switchboard tab, select SG on the (4) Gen. Selector switch on the Synchronization panel. Then press the (5) green ON button under Auto synchron, until the AUTO LED just above blinks. then you can check that the Shaft Generator has been connected (6) on the Generators tab. Next you will disconnect DG from the Main Bus, by returning to the Main Switchboard tab, move the (7) Gen Selector switch to DG2 and press the red OFF Auto synchron button until the AUTO LED blinks, then you should see it (9) disconnected on the Generators tab. Then repeat for DG1, steps 10-12.
66. Then on the Power Plant Control Panel, STOP DG2 using the (13) red button then set its Start mode switch to AUTO. Also (17) secure DG1, but set its (18) Start mode switch to OFF. On the Generators tab, close both the (19) Fuel and (20) Air intake valve to the right of DG1.
67. In the Cooling system, on the Control Panel tab turn OFF the (21) ME FW Heater switch. Then you can raise the (22) Control Level position on the Main Engine Control panel to 6.5, then 7.1 to start Section Y.
68. Wait for the RPM to reach 85 after setting ~7.1 on the Control Lever. then in the Steam system, on the Steam Diagram tab toggle the (3) Aux Boiler Fuel Kind selection value back to DO. Open the (4) Heat Recovery (HR) Circulating Pump Water Inlet valve, then the (5) HRE Steam Outlet valve. Then on the Steam Control Panel tab, select AUTO for (6) Circ. Pump #1 and make sure the (7) Burner switch is set to AUTO.



69. In the Final Section Z, on the (1) Bridge and (2) Engine Room select the Standby Operation Mode. then in the Steam system on the Control Panel, turn OFF (3) Circ. Pump #1, and close the two HR valves that connect the HRE to the Aux. Boiler in steps 4-5.
70. Prepare to restart DG1, by opening its (6) Fuel and (7) Air inlet valves in the Power Plant system. Briefly turn on (8-9) its Pre-lub. pump and move its (10) Start mode watch to MANUAL. Start it using the (11) green START button, then reconnect it to the Main bus as indicated in steps 12-14. But make sure to leave the (15) Gen. Selector rotary switch in SG.
71. Then finally go back to the Main Engine Control Panel and throttle back the Control Lever to 4.8, and you are complete!

## Step by Step Instructions from v2.5 (from Help Dialog, for reference)

### Dead Ship Conditions

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!!! Setup 'Dead Ship Conditions' has been loaded !!!

#### A. Bunker DO

---

..... Go to Power Plant

1. Main switchboard shore connection breaker position should be set at ON.

..... Go to Fuel System

2. Fuel port intake valve should be OPEN.
3. Wait until DO deep tank is almost full.
4. Fuel port intake valve should be CLOSED.

#### B. Bunker HFO

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1. Fuel oil deep tank inlet valve should be OPEN.

2. Fuel intake to fuel storage tanks valve should be OPEN.

3. Fuel intake filter outlet valve should be OPEN.

4. Fuel starboard intake valve should be OPEN.

5. Wait until fuel oil deep tank is almost full.

6. Fuel oil starboard tank inlet valve should be OPEN.

7. Fuel oil deep tank inlet valve should be CLOSED.

8. Wait until fuel oil starboard tank is almost full.

9. Fuel oil centre tank inlet valve should be OPEN.

10. Fuel oil starboard tank inlet valve should be CLOSED.

11. Wait until fuel oil centre tank is almost full.

12. Fuel oil port tank inlet valve should be OPEN.

13. Fuel oil centre tank inlet valve should be CLOSED.

14. Wait until fuel oil port tank is almost full.

15. Fuel starboard intake valve should be CLOSED.

16. Fuel oil port tank inlet valve should be CLOSED.

17. Fuel intake filter outlet valve should be CLOSED.

18. Fuel intake to fuel storage tanks valve should be CLOSED.

#### C. Bunker Lub. and Cyl. Oil

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..... Go to Lubricating System

1. ME lub. oil tank #1 refilling valve should be OPEN.

2. ME lub. oil system intake valve should be OPEN.

3. ME lub. oil tank #2 refilling valve should be OPEN.

4. Wait until ME lub. oil tank #1 is almost full.

5. ME lub. oil tank #1 refilling valve should be CLOSED.

6. Wait until ME lub. oil tank #2 is almost full.

7. ME lub. oil system intake valve should be CLOSED.

8. ME lub. oil tank #2 refilling valve should be CLOSED.

10. DG lub. oil system intake valve should be OPEN.

11. DG lub. oil tank refilling valve should be OPEN.

12. Wait until DG lub. oil tank is almost full.
13. DG lub. oil system intake valve should be CLOSED.
14. DG lub. oil tank refilling valve should be CLOSED.
15. ME cylinder oil tank refilling valve should be OPEN.
16. Wait until ME cylinder oil tank is almost full.
17. ME cylinder oil tank refilling valve should be CLOSED.

#### D. Bunker Fresh Water

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..... Go to Steam System

1. Hot well refilling valve should be OPEN.
2. Wait until hot well refilling tank is almost full.
3. Hot well refilling valve should be CLOSED.

..... Go to Cooling System

4. FW gravity tank refilling valve should be OPEN.
5. Wait until FW gravity tank is almost full.
6. FW gravity tank refilling valve should be CLOSED.

#### E. Fill DG Start Air Receiver

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..... Go to Compressed Air System

1. DG start air receiver refilling valve should be OPEN.
2. Emergency compressor should be switched ON.
3. Wait until DG starting air pressure is higher than 2.5 MPa.
4. Emergency compressor should be switched OFF.

#### F. Fill DO Service Tank

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..... Go to Fuel System

1. DO deep tank suction valve should be OPEN.
2. DO service tank refill valve should be OPEN.
3. Click on DO hand pump symbol until DO service tank is almost full.

#### G. Start First DG

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..... Go to Cooling System

1. Port side kingston valve should be OPEN.

..... Go to Compressed Air System

2. DG start air receiver drain valve should be OPEN.
3. DG start air receiver drain valve should be CLOSED.
4. DG start air receiver main valve should be OPEN.

..... Go to Power Plant

5. DG1 start air inlet valve should be OPEN.
6. DG1 fuel inlet valve should be OPEN.
7. DG1 pre-lubricating pump switch position should be set at ON.
8. DG1 pre-lubricating pump switch position should be set at OFF.
9. DG1 mode switch position should be set at MANUAL.
10. DG1 start button should be PRESSED until DG is started.

## H. Connect First DG to Busbars

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1. Generator synchronization selector should be set at DG1.
2. DG1 stator preheating switch position should be set at ON.
3. DG1 stator preheating switch position should be set at OFF.
4. Main switchboard shore connection breaker position should be set at OFF.
5. DG1 main breaker button position should be set at PRESSED.  
..... Go to Cooling System
6. DG sea water pump #1 switch position should be set at ON.
7. DG sea water pump #2 switch position should be set at STANDBY.

## I. Prepare Standby DG

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..... Go to Compressed Air System

1. Start air receiver #1 auxiliary air valve should be OPEN.
2. DG start air system refilling valve should be OPEN.  
..... Go to Power Plant
3. DG2 fuel inlet valve should be OPEN.
4. DG2 start air inlet valve should be OPEN.
5. DG2 stator pre-heating switch position should be set at STANDBY
6. DG2 pre-lubricating pump switch position should be set at AUTO.
7. DG2 start mode switch position should be set at AUTO.
8. DG standby selection switch position should be set at DG2.

## J. Start SW Cooling

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..... Go to Cooling System

1. Sea water pump #1 switch position should be set at ON.
2. Sea water pump #2 switch position should be set at STANDBY.

## K. Start ME Compressors

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..... Go to Compressed Air System

1. Start air receiver #2 refilling valve should be OPEN.
2. Start air receiver #1 refilling valve should be OPEN.
3. Start air compressor #1 switch position should be set at AUTO.
4. Start air compressor #2 switch position should be set at AUTO.

## L. Fill ME Sump

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..... Go to Lubricating System

1. Lub. oil transfer system L5 valve (before sump) should be OPEN.
2. Lub. oil transfer system L3 valve (before separator) should be OPEN.
3. Lub. oil transfer system L1 valve (after suction from tanks) should be OPEN.
4. ME lub. oil tank #1 suction valve should be OPEN.
5. Wait until the half of ME sump is filled with LO.
6. ME lub. oil tank #1 suction valve should be CLOSED.
7. Lub. oil transfer system L1 valve should be CLOSED.
8. Lub. oil transfer system L3 valve should be CLOSED.

## M. Fill Boiler Hot Well

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..... Go to Steam System

1. Hot well refilling pump suction valve should be OPEN.
2. Hot well refilling pump switch position should be set at ON.
3. Wait until hot well is almost full (in upper alarm range).
4. Hot well refilling pump switch position should be set at OFF.

## N. Fill Aux. Boiler

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1. Auxiliary boiler venting valve should be OPEN.
2. Auxiliary boiler feed valve #1 should be OPEN.
3. Auxiliary boiler feed pump #1 switch position should be set at ON.
4. Wait until water level in the boiler is in the normal range.
5. Auxiliary boiler feed pump #1 switch position should be set at OFF.

## O. Start Aux. Boiler

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1. Auxiliary boiler burner fuel inlet valve should be OPEN.
2. Auxiliary boiler feed pump #1 switch position should be set at AUTO.
3. Auxiliary boiler burner switch position should be set at AUTO.
4. Wait until steam pressure in the boiler starts to rise.
5. Auxiliary boiler venting valve should be CLOSED.
6. Wait until steam pressure in the boiler is in the normal range.
7. Auxiliary boiler main steam valve should be OPEN.

## P. Synchronise Second DG

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..... Go to Power Plant

1. DG2 pre-lubricating pump switch position should be set at OFF.
2. DG2 mode switch position should be set at MANUAL.
3. DG2 start button position should be PRESSED until DG2 starts.
4. Generator synchronization selector should be set at DG2.
5. Synchronization mode switch position should be set at AUTO.
6. Automatic generator synchronization on button should be set PRESSED until Auto LED blinks.

## Q. Prepare HFO Supply

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..... Go to Fuel System

1. Fuel oil centre tank suction valve should be OPEN.
2. Fuel oil starboard tank suction valve should be OPEN.
3. Fuel transfer pumps suction from fuel storage tanks valve should be OPEN.
4. Fuel transfer pumps discharge to fuel settling tank should be OPEN.
5. Fuel oil settling tank no.2 inlet valve should be OPEN.
6. Fuel transfer pump no.1 switch position should be set at ON.
7. Fuel oil settling tank no.1 inlet valve should be OPEN.
8. Wait until fuel oil settling tank no.2 is almost full.
9. Fuel oil settling tank no.2 inlet valve position should be CLOSED.

10. Wait until fuel oil settling tank no.1 is almost full.
11. Fuel transfer pump no.1 switch position should be set at OFF.
12. Fuel oil settling tank no.1 inlet valve should be CLOSED.
13. Fuel transfer pumps discharge to fuel settling tank should be CLOSED.
14. Fuel transfer pumps suction from oil collection tank valve should be CLOSED.
15. Fuel oil centre tank suction valve position should be CLOSED.
16. Fuel oil starboard tank suction valve position should be CLOSED.
17. Fuel oil settling tank no.1 suction valve should be OPEN.
18. HFO serv. tank refill valve should be OPEN.
19. Fuel oil purifier no.1 heating steam inlet valve should be OPEN.
20. Fuel oil purifier no.2 heating steam inlet valve should be OPEN.
19. Fuel oil purifier no.1 switch position should be set at STANDBY.
20. Fuel oil purifier no.2 switch position should be set at STANDBY.
21. Wait until HFO serv. tank is almost full.
22. Fuel supply pump #1 switch position should be set at ON.
23. Fuel supply pump #2 switch position should be set at STANDBY.
24. Fuel circulating pump #1 switch position should be set at ON.
25. Fuel circulating pump #2 switch position should be set at STANDBY.
26. Auxiliary boiler fuel kind selection valve position should be set to HFO.

#### R. Prepare ME cooling and lubricating

---

..... Go to Cooling System

1. FW pump #1 switch position should be set at ON.
2. FW pump #2 switch position should be set at STANDBY.
3. FW pre-heater switch should be set at ON.

..... Go to Lubricating System

4. ME cylinder oil service tank refilling valve position should be OPEN.
5. Cyl. oil pump switch should be set at ON.
6. Wait until ME cylinder oil service tank is almost full.
7. Cyl. oil pump switch should be set at OFF.
8. ME lubricators refilling valve position should be OPEN.
9. ME LO pump #1 switch position should be set at ON.
10. ME LO pump #2 switch position should be set at STANDBY.
11. LO pre-heater switch should be set at ON.

#### S. Prepare Compressed Air System

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..... Go to Compressed Air System

1. Start air receiver #1 drain valve should be OPEN.
2. Start air receiver #2 drain valve should be OPEN.
3. Start air receiver #1 drain valve should be set at CLOSED.
4. Start air receiver #2 drain valve should be set at CLOSED.
5. Start air receiver #1 auxiliary air valve should be OPEN.
6. Start air receiver #1 control air valve should be OPEN.
7. Start air receiver #1 main delivery valve should be OPEN.
8. Start air receiver #2 auxiliary air valve should be OPEN.
9. Start air receiver #2 control air valve should be OPEN.
10. Start air receiver #2 main delivery valve should be OPEN.

- 11.DG start air receiver refilling valve should be OPEN.
- 12.Emergency stop air delivery valve should be OPEN.
- 13.Control air delivery valve should be OPEN.
- 14.Air distributor inlet valve should be OPEN.

#### T. Prepare ME

---

..... Go to Bridge

3. Bridge telegraph Standby switch position should be set at ON.

..... Go to Main Engine

4. ME telegraph Standby switch position should be set at ON.

5. Lubricator handle position should be set at HIGHER.

6. ME indicator valve #1 should be OPEN.

7. ME indicator valve #2 should be OPEN.

8. ME indicator valve #3 should be OPEN.

9. ME indicator valve #4 should be OPEN.

- 10.ME indicator valve #5 should be OPEN.

- 11.ME indicator valve #6 should be OPEN.

- 12.ME indicator valve #7 should be OPEN.

- 13.ME turning gear motor should be set at ASTERN.

- 14.ME turning gear motor should be set at OFF.

- 15.ME turning gear should be set at DISENGAGED.

..... Go to Compressed Air System

- 16.ME starting valve should be OPEN.

..... Go to Bridge

- 17.Bridge telegraph position should be set at DEAD SLOW AHEAD.

..... Go to Main Engine

- 18.ME telegraph position should be set at DEAD SLOW AHEAD.

- 19.Control lever position should be set at START.

- 20.Control lever position should be set at STOP.

..... Go to Bridge

- 21.Bridge Telegraph position should be set at STOP

..... Go to Main Engine

- 22.ME Telegraph position should be set at STOP

- 23.ME indicator valve #1 should be CLOSED.

- 24.ME indicator valve #2 should be CLOSED.

- 25.ME indicator valve #3 should be CLOSED.

- 26.ME indicator valve #4 should be CLOSED.

- 27.ME indicator valve #5 should be CLOSED.

- 28.ME indicator valve #6 should be CLOSED.

- 29.ME indicator valve #7 should be CLOSED.

..... Go to Compressed Air System

- 30.ME slow turning air valve should be OPEN.

..... Go to Main Engine

- 31.Auxiliary blower operation mode switch position should be set at AUTO.

..... Go to Miscell/Steering Gear System

- 32.Steering Gear Pump #1 Power Switch position should be set at ON.

- 33.Steering Gear Pump #2 Power Switch position should be set at ON.

- 34.Steering Gear Pump #1 Control Mode Switch position should be set at REMOTE.

35. Steering Gear Pump #2 Control Mode Switch position should be set at REMOTE.

..... Go to Bridge

36. Steering Gear Pump #1 Operation Mode Switch position should be set at ON.

37. Steering Gear Pump #2 Operation Mode Switch position should be set at ON.

## U. Start ME

---

..... Go to Bridge

1. Bridge telegraph position should be set at DEAD SLOW AHEAD.

..... Go to Main Engine

2. ME telegraph position should be set at DEAD SLOW AHEAD.

3. Control lever position should be set at START.

4. Wait until engine shaft speed reaches 40 RPM.

5. Control lever position should be set above 1.5.

## W. Set ME Manoeuvring Full Ahead Speed

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..... Go to Bridge

1. Bridge telegraph position should be set at FULL AHEAD.

..... Go to Main Engine

2. ME telegraph position should be set at FULL AHEAD.

3. Control lever position should be set at 5.5.

## X. Set ME Navigational Full Ahead Speed

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..... Go to Bridge

1. Bridge telegraph Navig. Full switch position should be set at ON.

..... Go to Main Engine

2. ME telegraph Navig. Full switch position should be set at ON.

3. Lubricator Handle position should be set at NORMAL.

..... Go to Power Plant

4. Generator synchronization selector should be set at SG.

5. Automatic synchronization ON button should be PRESSED until Auto LED blinks.

6. Wait until shaft generator is connected to bus bars.

7. Generator synchronization selector should be set at DG2.

8. Automatic synchronization OFF button should be PRESSED until Auto LED blinks.

9. Wait until DG2 is disconnected from bus bars.

10. Generator synchronization selector should be set at DG1.

11. Automatic synchronization OFF button should be PRESSED until Auto LED blinks.

12. Wait until DG1 is disconnected from bus bars.

13. DG2 stop button should be PRESSED.

14. DG2 start mode switch position should be set at AUTO.

15. DG2 pre-lubricating pump switch position should be set at AUTO.

16. Stand-by selection switch position should be set at DG2.

17. DG1 Stop button should be PRESSED.

18. DG1 start mode switch position should be set at OFF.

19. DG1 fuel inlet valve should be CLOSED.

20. DG1 start air inlet valve should be CLOSED.

..... Go to Cooling System

21.FW pre-heater switch should be set at OFF.

..... Go to Main Engine

22.Control lever position should be set at 6.5.

#### Y. Start Heat Recovery Steam System

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1. Control lever position should be set at 7.1.

2. Wait until engine shaft speed reaches 85 RPM.

..... Go to Steam System

3. Auxiliary Boiler Fuel Kind Selection valve should be set at DO.

4. HR circulating pump water inlet valve should be OPEN.

5. HR steam outlet valve should be OPEN.

6. HR circulating pump #1 switch position should be set at AUTO.

7. Auxiliary boiler burner switch position should be set at AUTO.

#### Z. Set Again ME Manoeuvring Full Ahead Speed

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..... Go to Bridge

1. Bridge telegraph Stand By switch position should be set at ON.

..... Go to Main Engine

2. ME telegraph Stand By switch position should be set at ON.

..... Go to Steam System

3. HR Circulating Pump #1 Switch position should be set at OFF.

4. HR Circulating Pump Water Inlet valve should be set at CLOSED.

5. HR Steam Outlet valve should be set at CLOSED.

..... Go to Power Plant

6. DG1 fuel inlet valve should be OPEN.

7. DG1 start air inlet valve should be OPEN.

8. DG1 pre-lubricating pump switch position should be set at ON.

9. DG1 pre-lubricating pump switch position should be set at OFF.

10.DG1 start mode switch position should be set at MANUAL.

11.DG1 start button should be PRESSED until DG is started.

12.Generator Synchronization Selector should be set at DG1.

13.Automatic synchronization ON button should be PRESSES until Auto LED blinks.

14.Wait until DG1 is connected to bus bars.

15.Generator synchronization selector should be set at SG.

16.Automatic synchronization OFF button should be PRESSES until Auto LED blinks.

..... Go to Main Engine

17.Control Lever position should be set at 4.8.

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Congratulations! You have finished the basic simulator training.