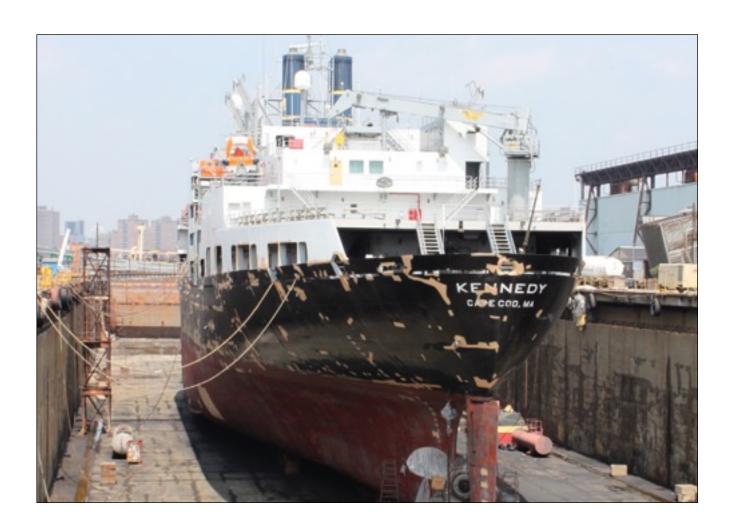
Auxiliary Machines I

Lab Book

Spring 2015



AUXILIARY MACHINE I: LAB BOOK

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AUXILIARY MACHINE I: LAB BOOK

Introduction

Auxiliary Machine Lab is an introduction to basic engineering skills. The six labs that will be covered will give the student an understanding of how to trace systems and create Piping and Instrumentation Diagrams (P&ID's). Lab meets every other week on a High or Low rotation.

Requirements for Lab:

Steel toed shoes, Eye protection, Hard hats, and Long sleeve boiler suits. Bring a Flashlight, Clipboard, Pen/Pencil, and Paper. If the student is not prepared for Lab, he/she will not be allowed to attend Lab and will receive an incomplete "I" for the Lab.

The Marine and Facility Engineering departments have given permission to use the Facilities located on MMA's campus to use for "Learning Labs". At NO time will students be allowed to operate any equipment in or around the Facility. This includes valve lineup as well. **Do not touch ANY valves, breakers, or switches.**

Labs are mandatory. This is a STCW lab. If you miss a lab, this will result in a failing grade for the semester until the lab has been made up at the instructor's convenience or the Fall of 2015.

Lab 1A - Hand Tools

Learning Objectives:

- * OICEW C1.6: Use of hand tools
- * AB-D D1.6: Knowledge of the application, maintenance and use of hand tools
- * Discuss the importance of the "lock out-tag out" safety procedure
- * Determine the proper hardware to be used by size and its use

Hand Tool Lab:

Modern Hand Tools:

- 1. Determine what tools are located in the Tool Boxes
- 2. On the Handout provided, identify the tools by name, use, and location in the tool box

Job Plan:

- 1. Determine what tools will be needed
- 2. Determine what Hardware is needed to complete the Job Plan

Work Sheet for Tool Box:

Tool Box Drawer	List The Tools You Find
1	
2	
3	
4	
5	
6	
7	

Job Plan Worksheet:

On each pump find the tools needed to remove the suction and discharge pipes from the flange. Place the correct tools for the job on the top of the tool box. Determine the correct bolt, nut, and gasket size.

Lab 1B - Wilkinson Steam Plant

Learning Objectives:

- * Knowledge of the phases of the steam cycle
- * Ability to identify equipment of all systems
- Identification of pipe fittings
- * Ability to interpret and draw a P&ID

Lab Directions

Identify and trace all systems listed below.

Fuel System:

1. Identify valves and pipe fittings

Steam System:

1. Identify valves and pipe fittings

Condensate / Feedwater System:

- 1. Identify pumps
- 2. Identify valves and pipe fittings

Circulating Water System:

- 1. Identify pumps and location of pumps
- 2. Identify valves and pipe fittings

City Water:

1. Identify valves and pipe fittings

Assignment:

To complete this Lab the student will have to at the beginning of the next Lab, completely trace out the above mentioned systems and turn in the finished P&ID. Drawings will be graded on accuracy and neatness. Hand drawn or CAD will be accepted. All hand drawn P&ID's must have straight edges. On a spreadsheet create an inventory of all pipe fittings for the condensate/feedwater system. Write a brief description of the Wilkinson Steam Cycle compared to the TS Kennedy Steam Cycle.

Abs press, Temp, Sat Sat Sat Sat Ilquid vapor Ilquid 0.50 79.58 0.01608 641.4 47.6 1048.8 1096.4 1.0 101.74 0.01614 333.6 69.7 1036.3 1106.0 5.0 162.24 0.01640 73.52 130.1 1001.0 1131.1 114.7 212.00 0.01672 26.80 180.0 970.4 1156.3 20.01672 26.80 180.0 970.4 1156.3 20.01672 26.80 180.1 965.7 1160.6 25.27.96 0.01683 20.069 196.2 960.1 1156.3 20.01672 26.29 181.1 969.7 1169.7 24.00 1177.6 25.29 181.1 969.7 1169.7 25.017.0 0.017.7 8.515 250.1 924.0 1177.6 26.7 250.1 922.7 1169.7 26.7 26.7 26.7 26.7 26.7 26.7 26.7 26			Table 2. Sa	Saturation, F	Pressures		
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SG-0004

Steam Generators 1181

Lab 2A - Stationary Shore Boiler

Learning Objectives:

- * Demonstrate a basic knowledge of thermodynamics
- * Ability to read steam tables
- * Knowledge of what a hot water boiler is and an unfired pressure vessel is

Lab Directions:

Identify and trace all systems listed below. Record temperature and pressure readings. Compare them to the values found on the steam table.

P&ID's:

Fuel System Hot Water System Steam/Condensate System City Water Nitrogen

Include all pumps, strainers, and valves that are in these systems. For the steam/condensate system, make sure you trace it to the ship and back. No need to include fittings for the shore boiler.

Assignment:

Lab 2B - Main and Auxiliary Circulating Water System

Learning Objectives:

The objective is for the students to trace out the Main and Auxiliary Circulating System and to become familiar with all the main parts, equipment, their function, and where they are located in the system.

Lab Directions:

Trace the main circulating system from the high and low suction to the main condenser, lube oil coolers, and overboard.

Trace the auxiliary circulating system from the high and low suction to the auxiliary condenser, auxiliary lube oil cooler, wind box, and overboard.

Assignment:

Lab 3A - Shoreside Sanitary Treatment Facility

Learning Objectives:

- * Knowledge of the phases in the treatment plant
- * Understanding of regulations that apply to the treatment of the plant
- * Ability to define terminology

Lab Directions:

Trace the lines from the lift stations to the pump station. Once into the building, identify the stages of treatment.

Sanitary Treatment Systems:

- 1. Influent (Untreated)
- 2. Effluent (Treated)
- 3. Sludge
- 4. Chemical Addition System

Assignment:

Lab 3B - Shipboard MSD

Learning Objectives:

- * Preparation for the STCW assessment
- * To gain familiarity with the MSD
- * Knowledge of the CFR regulations
- Understanding of how the lift station ties into the shore plant

Lab Directions:

Trace the black water and gray water lines going to the MSD, lift station, overboard, and holding tanks.

Shipboard Sanitary System:

Black Water Gray Water Influent Effluent

Assignment:

Lab 4A - Fire Protection System

Learning Objectives:

- Demonstrate knowledge of the fire protection system
- * Comprehend the difference between a wet and dry system
- * A better understanding of P&ID's
- Compare the TS Kennedy's sprinkler system to the shoreside system

Lab Directions:

The student will trace the TS Kennedy fire system and sprinkler system. Once done with the TS Kennedy, then head over to the ABS Information Commons and trace the shoreside system. Lastly, trace the dorm sprinkler system over by 6th company.

TS Kennedy Fire System:

- 1. Fire pump #1
- 2. Fire pump #2
- 3. Fire pump #3
- 4. Main header

TS Kennedy Sprinkler System:

- 1. Two Hold sprinkler system
- 2. Salt Water sprinkler pump

Shore Side Sprinkler System:

- 1. ABS Information Commons
- 2. Dorm sprinkler system

Assignment:

Lab 4B - Micro Turbines

Learning Objectives:

- * Determine how the Micro Turbines provide hot water heating
- * Demonstrate an understanding of how the Micro Turbines interact with the boilers
- * Ability to explain how the city water ties into the system

Lab Directions:

The student will trace out the Micro Turbines systems in 6th company. These systems consist of the following P&ID's:

P&ID's:

HW Supply HW Return Domestic Hot Water City Water Fuel

Assignment:

Lab 5 - Geothermal System

Learning System:

- * Basic knowledge of a heat pump system
- * Elementary understanding of how building ventilation works
- Ability to trace lines individually
- * Knowledge of basic HVAC equipment

Lab Directions:

The student will trace the geothermal system located in the ABS Information Commons. Only use ONE of the air handling units and ONE heat pump.

Geothermal Systems:

- 1. HW Supply
- 2. HW Return
- 3. CW Supply
- 4. CW Return
- 5. Glycol
- 6. Well Supply
- 7. Well Return

Assignment:

Lab 6 - Fuel Oil Manifold

Learning Objectives:

- * AB E A6.1: Knowledge of oil transfer operations
- * AB E A6.1: Preparations for fueling and transfer operations
- * AB E A6.1: Procedures for connecting and disconnecting fueling and transfer hoses
- * AB E A6.1: Procedures relating to incidents that may arise during fueling or transferring operation
- * AB E A6.1: Procedures for securing from fueling and transfer operations
- * ABE 1 6A: Assist with fuel oil transfer

Lab Directions:

- 1. Trace out the piping system and familiarize yourself with the equipment
- 2. Discuss the objectives and job hazards
- 3. Unbolt and remove the blank 6" flange from the manifold
- 4. Install grounding conductor between both manifold assemblies
- 5. Rig the cargo hose with the lifting gear and bolt up the flange connection using a new gasket and spud wrenches for alignment purposes
- 6. Tighten up the flange connection evenly
- 7. Once both sides of the cargo hose has been bolted up, prepare to pressure test the connections
- 8. Connect one end of the 1-1/2" fire hose to the dock siamese connection and the other end to the equipped fitting on one of the manifold assemblies
- 9. Verify that all valves on the manifold are in the correct position
- 10. Open the manifold vent line and close the drain valve
- 11. Open the fresh water supply from the dock system and slowly open the fresh water manifold supply valve to fill up the manifold header
- 12. Once the vent line is discharging water close the valve
- 13. Then proceed with the transferring of "fuel"
- 14. Check for leaks and if need repair
- 15. Once done shut off the water supply then drain the system
- 16. Make sure everything is back in the job box