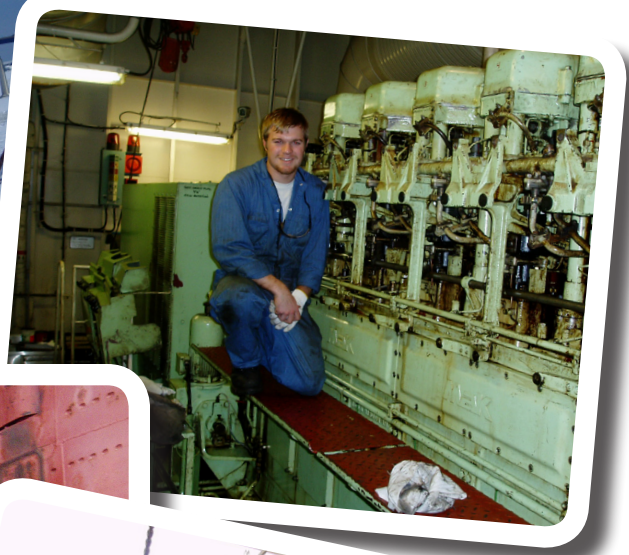
Engineering Sea Term Project 2015

Massachusetts Maritime Academy



Engineering Sea Project Summer 2015

MMA Engineering Department

June 2, 2015

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Instructions

These instructions contain the requirements for the sea term project that you will complete during your 2/c *Commercial Sea Term.* These requirements are applicable to steam, diesel, and gas turbine powered vessels. The sea term project is six hours of academic credit, and is expected that your sea project will reflect an equivalent effort.

Read the instructions in this section carefully, as a portion of your project grade will be determined by how well you follow them.

Content

You must submit an individual project that contains your own work. Research your answers using the ship's officers, ship's manuals, textbooks and your own observations. Use your own words in describing equipment, systems, and procedures and as much as possible base your report on what you have actually seen and done. Technical manuals and old projects must not be copied verbatim. Projects containing clear evidence of plagiarism may be referred to the honor board and/or given a failing grade at the discretion of the engineering department.

You are being graded on quality, not quantity. Well written, concise yet thorough answers are best. Answer questions using complete sentences, and avoid abbreviations. You should attempt to give a description that another cadet reading the report could understand. Don't forget to include basic facts such as, purpose, capacity, operating conditions, etc. Give specific information whenever possible; avoid broad generalities. If there is a required section which does not apply to your vessel, briefly state why the section is not applicable and the section will not be graded, nor will you lose points for not completing it. However, you may need to complete an additional optional section in order to fulfill the sea project requirement to complete a minimum of 30 topics. All text in this report must be completed with a word processing program and submitted in a one-inch thick 3-ring binder with your name on the spine. Include a title page, and a footer on each page you write giving your name, vessel name and a sequential page number. The report should be organized in the same order as the assignment given in the next section. Sections should be clearly labeled to correspond with the assignment, and inserted in the notebook in order with the major sections separated with dividers.

Required diagrams and illustrations may be hand sketches, CAD drawings, or photocopies from ship's manuals at your choice, however poor quality photocopies and sloppy sketches should not be included. Be sure to get permission before using the vessel's photocopier. All attachments should serve a purpose

in your project, so if you include something, discuss it in the body of your report. Do not pad your report with unnecessary photocopies of manual pages, log sheets, company policies, etc. that you haven't discussed, and do not use sheet protectors to "bulk up" your project. Use sheet protectors only where necessary to hold small items which would otherwise get lost.

Notwithstanding the previous paragraph, for the "Plates" section of the sea project, you must *personally* trace out and draw the required system diagrams using CAD or another computer-drawing program. Plates must be clearly labeled, use the standard symbols used for components such as pumps and valves, and include a title block containing the system, your name, your ship's name, and the date drawn.

The specific content requirements of your sea project will depend on the type of ship you are assigned to, however all projects must contain a minimum of 30 topics and 5 plates. Refer to specific sea project requirements found in Section 2.

If possible, bring a digital camera and laptop computer to prepare your project on. Bring a flash drive, and backup all your work on to it every day. Keep it with you at all times. Don't forget that computers fail and disks get lost. No excuse will get you out of doing this project. Failure will mean you must make another training cruise.

Effort

This report done properly requires a lot of your time and effort. Typically you should invest at least two hours per day aboard the vessel towards the project (not including what is normally expected of you such as: watch, day work, and learning the plant), and try to answer one topic each day that you are aboard. After leaving the vessel another 10 to 20 hours should be sufficient to complete this project. The shipboard personnel and your other duties will also demand a lot of time and effort. You should pre-plan this report before reporting to the ship. Allocate your time wisely. Use this opportunity to enhance your Engineering capabilities and education.

Deliverables

Your project submission consists of a 1-inch binder containing your project, an electronic submission to *Turn-It-In*, and your STCW sign-off booklet.

Submit your completed project and STCW sign-off booklet to CDR Huhnke or Ms. Cervantes, in the STCW Licensing Office on the 1st Floor of the Kurtz Hall during working hours. You must personally hand your project here to insure that it properly received and logged in. Your submission date will be the date it is accepted and logged in. Do not take chances with your report by leaving it improperly checked in, or by leaving it with someone else.

Submit an electronic copy of your project to *Turn-It-In* anti-plagiarism software at *http://www.turnitin.com*. Name your submission **yourname - shipname**. Before you can submit files to Turn-it-in, you will need to register using the class ID **10059703** and the enrollment password **4160_Volts**. Failure to submit a copy of your project will result in a grade of *Incomplete*, which will result in a course failure if not rectified within two weeks. You only need to submit your own original work: the written portion of your project, scrapbook, letter to department chair, etc. You don't need to submit photocopies from manuals, log sheets or other loose items included with your project.

Turn-it-in accepts work in the following formats: Plain Text, MS Word .DOC and .DOCX, WordPerfect, PDF, HTML, RTF, and others. PDF files work best, followed by MS word .DOCX files. More information about Turn-it-in file submission may be found here http://turnitin.com/en_us/training/student-training/submitting-a-paper. Turn-it-in submissions are limited to about 20 Mb in size. This limit will not normally be an issue unless your project contains a large number of uncompressed images. If your project exceeds the Turn-it-in size limit, try saving a copy as PDF, and using Adobe Acrobat or similar software to compress the PDF before submitting. As a last resort, save a copy as plain text, which will strip out all images.

Deadline

The sea term project is due **21 days** after the date of discharge from your vessel, or the following Monday, if the 21st day falls on a weekend. Reports may not be turned in on weekends or holidays. If the 21st day is before the beginning of the academic semester, you may turn your project in by Friday of the first week of class with no penalty.

Reports submitted after the deadline will lose the equivalent of one letter grade per week, accruing daily, and no project will be accepted beyond 30 days after the due date. Failure to turn in a project within **30 days** of the due date will result in an **automatic failure** for the commercial sea term.

Past experience has shown that cadets who continue to work on their project past the deadline rarely improve it enough to overcome the rapidly increasing lateness penalty. Turn your project in on time!

Grading

Your work will be graded according to the rubric found in at the end of this booklet in Section 4. Refer to this to see what is expected of you. Note that spelling, grammar, style, and organization are as important as technical correctness, and all of these factors will impact the project grade.

The evaluations and recommendations of the Chief Engineer and other licensed Engineers will also be used in determining your grade for the Commercial Shipping Sea Term. Your first obligation is to perform to their satisfaction.

The points for each section will be added to point scores for your daily journal, officer evaluations, and practical demonstrations. Letter grades will be assigned based on the point score earned in this manner. Completing optional sections will raise your point total and sea project grade. Late projects will have points deducted for each day late, up to a maximum of 30 days. Projects more than 30 days late will automatically receive an failing grade.

You can expect that a project which contains only the minimum number of sections, all graded as "minimum acceptable" will receive a "C" for a sea term grade. Higher quality work, optional sections, or both, will be required to earn a higher grade. Projects turned in late will receive a lower grade than the same work turned in on time.

When all sea projects have been graded a notice will be put in the POD announcing that sea projects may be picked up. This process usually takes at least 12–14 weeks from the beginning of the semester.

Advice to cadets

For several years, one question on the project asked cadets to give their advice to those who are about to ship out for the first time. The answer below was written by Eric Bookmiller '09, and is included here for your information.

After cadet shipping twice, there is a lot of advice I can give to a cadet going out to sea commercially for the first time.

The first piece of advice I have to offer is the most important: *safety*. Remember that you are not invisible just because you are wearing the proper PPE; the engine room has countless hazards all around you. Never start a job until you are fully aware of how to do it properly and safely. Do not be hesitant or embarrassed to ask questions if you are unsure about the task, generally, the engineers won't mind going over everything with you. Also, know where your lifeboat is and your duties for fire/emergency and abandon ship as soon as you get onboard.

If you are working a job, *work hard*. Do not be a "bull in a china shop," but work hard to impress the engineers you are working with; nobody likes a cadet who goes through the motions and lends no help. If you are assisting an engineer, always be a step ahead of him, be ready to hand him the right tool or give an extra hand. You will gain their respect when you work hard for them. This pays off later on when you have questions for your sea project; if they get along with you they are usually happy to go over things with you. If you are doing day work, never be the first one to coffee break unless you are making the coffee, and never be the last to leave unless you are cleaning up after everyone else.

If you are standing a watch, *observe, take notes and participate* as much as you can. Get involved without getting in the way; the reason you are out to sea is to learn as much as you can from a real world experience. If you participate in taking rounds or the common procedures, watch will not drag on and you will learn much more about operating an engine room. Most of the questions in the sea project are about operations, the more you do, the better you can answer these questions. Never be late to watch, you should observe how the engineers make a pre-watch round and how they relieve the watch.

Give respect to all crew members and do not complain about your duties. You are out there to learn and assist the engineering department, grumbling and whining about what the Chief wants from you will not get you anywhere. Do not argue with anyone about how something should be done because of how you learned it at school; as the Sea Training Instructions state: "experience is a worthy teacher." Be quiet in the passageways and your stateroom; even though it may be daytime, a ship operates 24 hours a day and there are people sleeping at all times.

Get as much of the sea project done as you can each day, *do not wait until the last couple of weeks*. There are usually many resources (such as technical manuals) in the engine room to help you. The engineers are a very good source of information and they are usually happy to help you if they are not busy. Do not just try to get answers from them; instead let them guide you in the right direction. Conversations in which you get to reason out the answers yourself make for a better learning experience. Save the project regularly on at least two different hard drives, i.e., your laptop and an USB flash drive. Update your daily log each day, it is amazing how quickly you can forget what you did just a few days ago. If you keep it updated, you can look back on it later to recall experiences; this helps when answering the sea project questions. Proof-read everything you will be submitting and turn everything in on time.

You will not need to bring any tools with you, there are plenty onboard. You may want to bring your own pair of channel-locks and a Leatherman to keep in your pocket on watch. Bring your laptop with you to complete your project while you are out to sea. Buy a prepaid phone card to use your cell phone

in foreign ports without racking up a huge roaming bill. Make sure your alarm clock has a battery back-up; you do not want to be late to watch because the ship was momentarily black. Bring a spare light bulb and batteries for your flashlight. Do not bring too many DVDs or put too many video games on your laptop. These will only distract you when you should be working on your project, or keep you up late when you need sleep. Bring enough to keep your sanity during downtime, but not too many. Your ship will most likely have the linens you need for your rack and the shower. Check with the company about what PPE you need to bring before you go out to sea.

Remember that you are out there to learn and assist the engineering department; *you are not on a pleasure cruise*. Work safe and hard, learn as much as you can, give respect to everyone, and keep working on the sea project. When you turn your project in, make sure it is on time and you get it time-stamped. GOOD LUCK!

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Sea Project Assignment

Your sea project assignment is to complete a minimum of 30 topics and 5 plates as described in this section, and the additional requirements described in Section 3.

Some topics below are marked with a letter, which designates the type of ship the topic applies to: **(S)** for steam ships, **(D)** for Diesel powered ships, **(G)** for Gas Turbine powered Ships and **(ATB)** for articulated tug/barges. These are the *required topics.* You must complete all the required topics for the type of ship on which you are serving.

Any topic which is not a required topic is an *optional topic.* You must complete enough optional topics to satisfy the 30 topic minimum assignment. You should choose optional topics in areas that you have direct experience with, or are meaningful for your ship, if possible. You may choose optional topics from any section, as long as they are appropriate for your vessel, even if that section is for a different propulsion mode.

You are free to choose which optional topics you complete, with the following limitations:

1. You are required to choose at least one optional topic from each of the following areas:
    - Shipboard Routine
    - Safety
    - Electric Power
    - Refrigeration and HVAC
    - Miscellaneous Topics
2. If more than one engine cadet is assigned to a ship, each cadet should select different optional topics from the available choices, to the extent possible. Work it out between yourselves and try not to duplicate optional sections until all the sections relevant to your ship have been done by somebody, however be sure to complete the required minimum of 30 topics in any case.

You may choose to complete additional optional topics, beyond the minimum requirements above. If you include additional topics in your report, they will be graded and their grades will be added to your project point total as extra credit. Since all topics you submit will be graded, your sea project grade will be higher if you include more topics.

1 Shipboard Routine

The questions in this section of the sea project acquaint the readers of your project with the particulars of your vessel and the duties and responsibilities of the Engineering personnel. You must complete the required sections and at least one additional section.

1.1 Description of the Ship - (SDG)

Describe your ship in your own words, including information such as:

1. Name of vessel and owner
2. Brief description of the propulsion plant (type, horsepower, etc.).
3. Type of vessel (tanker, container, other)
4. Route and service
5. Crew size
6. Specifications, such as:
    - construction (when, where, for who)
    - principle dimensions (length, tonnage, etc.)
    - operation (cruising speed, special operating services)

1.2 Description of the Engine Room (SDG)

Describe the engine room of your vessel. Include such items as:

1. Describe the machinery layout. What equipment is found on each level? What are the decks and flats called?
2. Give a short description of the main operating station or console to help acquaint the reader with your ship. Don't over do it here because question 2.3 asks for a more detailed description of the Main Engine Control System.
3. Describe your overall impression of the engine room regarding such things as size, machinery condition, cleanliness, etc.
4. Include a photocopy or diagram of the machinery layout of all levels of the main machinery space.

1.3 Manning

Describe the manning of your ship. How many in the crew? For each member of the engineering department, give name, job responsibilities, working hours, education (maritime academy, military, union school, hawse pipe, etc.), and years of sea experience.

1.4 Watchstanding Duties

Give a detailed description of how a licensed Engineer stands a watch, include the following:

1. relieving procedure
2. rounds - how often, what is checked
3. routine operations performed on watch
4. logbook - what is the procedure for maintaining the log?

1.5 Chief Engineer's Record Keeping

Describe the paper work that the Chief Engineer is responsible for and the type of information that the Chief submits to the Master and the company on a daily basis or voyage basis. Give photocopied examples of common reports.

1.6 Logbook and Standing Orders

1. How are engineering logs maintained on your ship? Are they written in a traditional logbook, or typed into a computer? Who collects the data, who makes the entries, and who is responsible for the logbook? What types of things are typically recorded? How are slip and fuel consumption calculated? Include a copy of a page from your ship's log.
2. What are the legal requirements for the logbook? Who is responsible? Where and how are old logbooks stored and retrieved? How long must they be maintained.
3. If a bell book is used, describe how bells are recorded and the symbols used. If an auto-logger is used describe it.
4. What are standing orders and night orders? Provide some interesting examples from your standing and/or night orders.

1.7 Regulatory Impact

Ask your ship's officers about shipboard operations or procedures which have changed as a result of international regulations. Cite the governing regulation and discuss the effectiveness of the regulation, including:

- Costs vs. Benefits
- Impact on shipboard operations
- Personal impact

2 Safety

A ship is a dangerous place. An accident or fire can have severe and costly consequences, and so safety is of critical importance to everyone on board and to the vessel owner. In this section you will describe the safety culture and policy aboard your vessel. You must complete the required sections and at least one additional section.

2.1 Safety - (SDG)

1. Describe the policies, culture, and attitudes of your ship and company regarding safety. For example, are written safety policies in place? Are they accepted and followed? What personal protective gear is worn in the engine room? What measures are taken to document and prevent repeat occurrences of accidents?
2. Attend a shipboard safety meeting, and report on what occurred.

2.2 Lock-out Tag-out - (SDG)

What is the purpose of Lock-out/Tag-out? Give several examples of shipboard hazards which can be mitigated by properly LO/TO following procedures.

Describe the procedure followed aboard your ship to properly isolate and remove energy sources from a piece of equipment or system.
What are the administrative procedures followed aboard your vessel What is logged? Who is notified? Where are the locks kept? Who can remove a lock? Etc.

2.3 Fire Protection

Describe the fire protection equipment found on your vessel: How many fire pumps, location, pump capacity, etc. What valves are left open on your vessel in the fire main at all times? What needs to be done to operate the system in the event of a fire?

Describe the fixed firefighting system? What zones are protected by the CO2 system? Describe operation of the system.

What other firefighting equipment is available on board?

2.4 Confined Space Entry

What is the definition of a confined space? What hazards do they present?

What paperwork required for entry into a confined space?

Describe the the equipment and procedures used to test the safety of the atmosphere within a confined space.

2.5 Chemical Storage

Describe the storage of engineroom chemicals aboard your vessel. Include:

- Storage location

- Types of chemicals stored
- Who has access
- How are they secured for sea
- Location of MSDS
- What to do in the case of a spill

2.6 Inert Gas

If your ship has an inert gas generator, describe it. Include details such as purpose, manufacturer's specifications, startup and shutdown procedures, and routine maintenance requirements.

List the conditions which will cause the unit to automatically shutdown, for example:

- oxygen content
- water pressure limits
- etc.

Provide a line diagram from the inert gas generator to the deck main and tanks.

2.7 Piracy

If your ship travels through pirate infested waters, describe in general terms the measures taken to protect the vessel against pirate attack, and any training you received in this area. Be careful not to disclose any confidential information.

2.8 Safety Management

What is the ISM Code? Briefly describe the purpose and origin of the ISM Code.

Describe the Safety Management System used aboard your ship. How is it implemented? What is it's impact on shipboard operations. How do the crew feel about the requirements?

3 Diesel Propulsion

The questions in this section apply to diesel powered ships only.

3.1 Engine Construction - (D)

1. Describe the main propulsion diesel engine aboard your vessel. In this overview mention: manufacturer, number of cylinders, stroke. Include a sketch or photocopy of a cross sectional diagram of the engine.
2. Discuss at least ten interesting features of your engine's construction including any of the following:
    - Cylinders, including heads, liners, seals, ports, cooling passages, valve gear, relief valves, etc.
    - Running gear including crankshaft, connecting rods, flywheel, vibration dampers, jacking gear, crosshead (if so equipped), piston assembly, etc.
    - Cylinder lubricator systems
    - Fuel injection system from the transfer pump through the injectors * Governor control and overspeed protection, including all interlocks and shutdowns
    - Maneuvering control, local and remote.
    - Slow-down features.
    - Starting and reversing mechanisms.
    - Turbocharger (or other) pressure charging system.
    - Cooling Systems

3.2 Engine Control System - (D)

1. Describe the main automation and control system used on your ship. Describe the console layout, systems monitored, and remote operation capabilities. What instruments are available for monitoring the status of the main engine?
2. Describe how the alarm system works from the operator's point of view. How does the engineer respond to normal alarms, nuisance alarms, old alarms, etc. Is it possible to change the alarm settings? What conditions will cause automatic shut-down or slow-down of the main engine?
3. Describe how main engine speed and direction control works. Include discussion of speed control, how commands are transmitted to the engine, and how to change over to bridge and local control.

3.3 Maintenance - (D)

1. Describe any diagnostic tests, such as taking indicator cards, firing pressures, firing temperatures, or vibration analysis performed aboard your vessel.
2. Describe the major and minor overhaul capabilities on board, including cranes, shops, test equipment, etc.
3. Describe any special tools used for engine maintenance.

3.4 Operations - (D)

It is important that critical operations such as starting the main engine are completed correctly. Operational checklists are often used to insure that no steps are forgotten, but they usually only provide brief reminders of what needs to be done, and are written for experienced operators.

1. For this section, provide copies of any checklists used by the ship's engineers for starting the main engine, getting underway, port arrival or shutdown. If no checklists are used, create them.
2. Participate in preparing the ship to get underway, and describe each step in detail. Include the purpose of the step. Your descriptions should be detailed enough to be helpful to a new engineer joining this ship. If any sub-procedures are described elsewhere in the sea project, it is not necessary to repeat them here; just refer to that section.

3.5 Drive Train

Describe the equipment involved in the transmission of power from the engine to the propeller. Include a sketch or photocopy of the drive train and refer to it as required to ensure a complete, detailed description.

Describe the shaft sealing arrangements.

3.6 Waste Heat Recovery

1. Describe any waste heat recovery system on your vessel.
2. Describe any waste heat boilers aboard your ship. Include:

    - brief description of boiler and service.
    - sketch or photocopy of the boiler.
    - maintenance requirements and responsibilities.
    - any noteworthy features of boiler, system, or operation.

3.7 Propulsion Generators

If your ship has diesel-electric propulsion, describe the main propulsion generators in this section. Include:

1. Describe the design and construction of the main propulsion generators, including electrical specifications.
2. Describe how the propulsion generators are integrated with the rest of the ship's electrical power systems.
3. Describe any safety or control systems associated with the generator.

3.8 Synchroconverters

If your electric propulsion ship uses a synchroconverter or other type of variable frequency drive: Discus the drive, including manufacturer and specs, purpose of the device, and a brief discussion of how it works.

Define harmonic distortion, and describe any provisions your ship uses to minimize it.

3.9 Propulsion Motors

If your ship includes diesel electric propulsion, describe the main propulsion motors in this section. Include:

1. What type of motor is used? Describe its theory of operation and provide its electrical specifications.
2. Describe the design and construction of the main propulsion motors.
3. Describe the provisions for cooling the motor.

3.10 Propeller

If your ship has an azipod or controllable pitch propeller, provided a sketch and describe how it works. In particular, how is hydraulic fluid transmitted between the moving and stationary parts?

3.11 Turbochargers

If your engine includes turbochargers, discuss the theory of operation, design and construction details, lubrication and cooling provisions, and maintenance and cleaning procedures.

4 Gas Turbine Propulsion

This topics in this section apply to gas turbine powered ships only, and cover the gas turbine systems, main throttle, reduction gears, line shafting, stern tube, propeller and associated bearings.

4.1 Main Plant - (G)

1. Describe all equipment involved in the transmission of power from the gas turbine to the propeller. Sketch the drive train and refer to it as required to ensure a complete, detailed description.
2. Give the manufacturer, date of manufacture, and pertinent statistics to permit anyone reading this to be able to visualize the overall plant. It should not read like a tech manual.
3. Describe the type of air compressor (how many stages etc.)
4. Describe the type of combustor (can, annular, can-annular etc.)
5. Describe the gas turbine type (single shaft/split shaft, how many stages etc.)

4.2 Gas Turbine Operation - (G)

1. Describe in detail the procedure for port arrival and shutdown regarding machinery, pumps, levels, etc.
2. Describe in detail putting a gas turbine on-line. Also include a description of the normal procedure for taking one gas turbine off the line. Discuss your participation, if any, in the above events.
3. Describe in detail the procedure for standby bells at sea regarding machinery, pumps, levels, etc.
4. If equipped with propeller shaft driven generators, describe use of same.

4.3 Main Engine Control System - (G)

1. Describe the control devices and instrumentation that are used in the operation of the gas turbine. Include in your description the function and mode of operation (electronic, pneumatic, etc.) Some typical applications are given below:
    - lube oil alarms
    - speed control
    - combustion control – fuel and air
    - flame out control
2. Describe the operation of the throttle (speed) control.
3. Discuss any associated automation in your own words.
4. Include a description of any gas turbine safety devices.

4.4 Gas Turbine Maintenance - (G)

1. Describe any routine or special maintenance that is performed on the engine. Describe any special tools or equipment required to complete this maintenance.
2. Describe any diagnostic tests such vibration analysis performed aboard your vessel.
3. Describe the major and minor overhaul capabilities on board, including cranes, shops, test equipment, etc.

4.5 Main Engine Starting System - (G)

Describe the gas turbine starting system. Also discuss any backup systems that may exist.

4.6 Waste Heat Recovery - (G)

1. Describe any waste heat recovery system on your vessel.
2. Describe any waste heat boilers aboard your ship. Include:
    - Brief description of boiler and service.
    - Sketch or photocopy of boiler.
    - Maintenance requirements and responsibilities.
    - Any noteworthy features of boiler, system, or operation.
3. If an unfired boiler is used to create steam for a steam turbine, describe the steam turbine and its use.

4.7 Main Engine Packing

1. Discuss the gas turbine gland packing.
2. Include a photocopy or sketch of the gas turbine gland packing.

4.8 Reduction Gears

1. Describe the arrangement of the reduction gears, pinions, bearings and internal L.O. system.
2. Describe the jacking gear system.
3. Include a photocopy or drawing of the reduction gears

5 Steam Propulsion

The topics in this section apply primarily to steam turbine powered ships and covers the boilers, steam systems, main throttle, main steam turbines, reduction gears, line shafting, stern tube, propeller and bearings. Some of these questions may apply to other types of ships, and if so, may be used as optional topics.

5.1 Boiler Construction - (S)

1. Describe in your own words the boilers that are installed on your vessel and how they differ from the boilers on the *Kennedy*. Include a brief discussion of superheaters, economizers, air heaters, downcomers, generating tube bank waterwalls, soot blowers, and safety valves. Also include a short description of all internal fittings contained, such as desuperheater, dry pipe, internal feed line, baffles, steam separators, etc.
2. Include a photocopy or sketch of the boiler in cross section.

5.2 Main Plant - (S)

1. Describe the main propulsion system from the boiler superheater outlet through the main engine to the main condenser, including the turbines, bearings, line shafting, and propeller.
2. Describe any routine operational requirements of this equipment.

5.3 Boiler Maintenance - (S)

Describe your experience working with the Second Engineer (with permission) in the maintenance projects going on regarding the boilers. If at all possible, try to get experience in the following areas and describe the projects you worked on:

- inspection of fireside and watersides
- boiler cleaning of firesides and watersides
- brickwork and refractory maintenances
- hydrostatic testing
- gage glass rebuilding and installation
- soot blower repairs
- boiler casing maintenance

5.4 Boiler Operation - (S)

1. Describe the procedure for port arrival and shutdown regarding machinery, pumps, levels, etc.
2. Describe the procedure for cutting a boiler on-line with the other boiler already steaming. Include the features of operation of the boilers, under maneuvering and steady steaming conditions. Also include a description of the normal procedure for cutting one boiler off the line. Discuss your participation, if any, in the above events.
3. Describe in detail the procedure for standby bells at sea regarding machinery, pumps, levels, etc.

5.5 Main Feed Pumps

1. Describe the vessel's main feed pumps in terms of the following:
    - manufacturer's data and number of pumps
    - type of prime mover
    - normal operational discharge pressure
    - type of pump pressure regulator utilized with a description of how the regulator works
    - number of pump stages.
2. Describe how the pump is protected in the event the pump is operated at the shutoff condition.
3. Describe the starting, securing and changeover procedures

5.6 Fuel Oil System Operation - (S)

1. Describe the layout of the fuel oil system, including the pumps, heaters, fuel tanks, etc.
2. Describe the proper procedure for transferring fuel oil to the day tank or settler. How often is this done?
3. Describe the proper procedures for changing over fuel oil suction and cleaning the discharge strainers.
4. What is the vessel's fuel consumption per watch, both in port and at sea?

5.7 Boiler Control Devices - (S)

Describe the control devices and instrumentation that are used in the operation of the boiler. Include in your description the function and mode of operation (electronic, pneumatic, etc.) Some typical applications are given below:

- high-low water alarms
- feedwater control
- combustion control - fuel and air
- super heat/desuperheat control (if installed)
- remote reading indicators (water level, air pressure)

5.8 Chemical Treatment and Testing - (S)

1. What boiler water tests are conducted on your vessel, and why are they conducted.
2. Describe the test procedure. If possible, perform the test yourself for several days
3. Describe the treatments available to improve the results of the chemical tests.
4. Present a typical day's test results and give treatment required.

5.9 Main Engine Control

1. Describe the operation of the throttle and nozzle control for the ahead and astern turbines.
2. Discuss any associated automation in your own words.
3. Include a description of any main turbine safety devices.

5.10 Ship's Service Turbo generator

1. Describe the ship service generator turbines.
2. Describe the turbogenerator governor overspeed trip and various safety devices.
3. Include a photocopy or sketch of the system.

5.11 Steam Piping Systems

1. Describe how the main steam piping is warmed up and drained prior to being placed in service.
2. List the reducing stations utilized aboard your vessel and what systems they supply.
3. Describe what types of reducing valves are utilized (pneumatic, mechanical).

5.12 Main L.O. Strainer

Clean and inspect the main L.O. strainer, then:

1. Describe what you did.
2. Describe what was found.
3. Describe how often does the strainer get routinely inspected?

5.13 Stack Gas Analysis

Perform a stack gas analysis, then:

1. Describe the procedure.
2. Describe the type of stack gas analysis system used on board your vessel.
3. Indicate a typical day's readings in port and at sea.

5.14 Fuel Oil Burners

1. Describe the burners and fuel oil atomization system on your boiler.
2. Describe any igniters, flame scanners, or other burner automation.
3. Describe how the burners are lit off and maintained.

5.15 Turbine Glands

1. Discuss the main engine turbine packing and gland sealing system.
2. Include a Photocopy or sketch of the system.

5.16 Reduction Gears

1. Describe the arrangement of the reduction gears, pinions, bearings and internal L.O. system.
2. If possible, inspect the gears and oil spray patterns in company with the Chief. Describe what you saw and the conditions that exist.
3. Describe what precautions should be taken when inspecting the gears.

5.17 Bearings

1. Describe the design, lubrication and location of all thrust bearings on the main turbine, reduction gears and line shaft.
2. Describe a turbine journal bearing.
3. Describe how, and how often the bearings are inspected.
4. Describe what could be done onboard if a bearing wiped

6 Electric Power

This section of your sea project deals with the electric power distribution, motors and generators aboard your vessel. You must complete the required topics and at least one of the optional topics.

6.1 Electrical Power Distribution - (SDG)

1. Draw a simplified one-line diagram showing the overall distribution of power on board your ship. Include all generators, buses, shore power connection, and major consumers of power. Include all switchgear used for interconnecting the main and emergency busses. Indicate voltage and voltage type (3 phase, single phase, DC)
2. Describe any conventions used for labeling circuits and distribution panels aboard your ship. Which circuit breaker supplies your stateroom, and what is its trip rating?
3. Describe the largest capacity circuit breaker found on your ship. Give its purpose, thermal and instantaneous trip ratings, and any interesting features.

6.2 Emergency Generator and Switchboard - (SDG)

1. Briefly describe the emergency generator and its prime mover. Include manufacturers specifications, and capacity.
2. Describe the emergency switchboard including:
    - The instruments and controls provided to start and monitor the operation of the generator.
    - The equipment which is powered from this switchboard.
    - How the emergency generator automatically starts and picks up load when the ship's service generators fail.
    - How the emergency generator can be used to feed-back power to the main switchboard. When would this be done?
3. Describe any tests that are regularly conducted on the emergency generator. Who is responsible for this testing? Describe this routine as you have observed it.

6.3 Ground Fault Detection - (SDG)

1. What is a ground fault, and how is it different from an intentional ground, such as when a machine is bolted to its foundation, or a portable tool is grounded with a three-prong plug? What are some common causes of ground faults?
2. Sketch and discuss how the ground fault detecting system used aboard your ship works.
3. Describe how a ground fault is located, once it has been detected.
4. Ask the ship's engineers to describe any memorable ground faults that occurred onboard the vessel. What was the problem? How was it found? What was the cause?

6.4 Generator Operation

1. Describe the procedure for manually starting a ship's service generator
2. Describe the procedure for paralleling a ship's service generator with another one already on the bus. If your ship has auto-synch, describe how the generators can be manually synchronized as well.
3. Describe what would happen if the ship was underway with two service generators operating in parallel, each carrying 75% of rated load, and the prime mover of one tripped.

6.5 Generator Construction

This question refers to the generator itself, not its prime mover.

1. Copy or photograph the nameplate from one of your ship's generators, and describe the meaning of each item found there.
2. Describe the construction of the generator: field, armature, excitation, cooling etc.
3. Describe how the field excitation system and voltage regulation works on this generator.

6.6 Motor Control

1. What is the purpose of a motor controller?
2. Include a motor control circuit diagram for a large motor aboard your vessel. Describe the operation and special features of the motor controller you have selected.
3. Define Low Voltage Protection (LVP), Low Voltage Release (LVR).
4. Identify three motors with LVP Control, and three with LVR control.
5. Define Soft-Start. When would soft starting be advantageous?

6.7 Insulation Resistance

1. Describe the purpose and administrative procedure for measuring insulation resistance aboard your ship.
2. Describe in detail, how a megger is used, including safety considerations.
3. Describe from past records what has been the trend of the insulation resistance values of the ship's service generators from year to year?
4. Check with the engineers to determine if any unusually low "Megger" readings were experienced, and what was the cause of the trouble

6.8 Emergency DC Power

1. Describe the emergency battery installation on the ship and list the equipment supplied. Include the voltage and capacity of the batteries. How are the batteries interconnected with the rest of the distribution system?
2. Describe the battery charging system. Describe the routine maintenance performed on the batteries.
3. If your ship has an uninterruptible power supply (UPS) for emergency power to equipment (not personal computers), describe it.

6.9 Shore Power Connection

Sketch and discuss the shore power connection aboard your ship, including amperage capacity and the shore power cables and connections. Discuss the procedure used and the safety precautions taken when connecting and disconnecting shore power. Can you parallel with shore power?

6.10 Cleaning Electrical Machinery

1. Describe why it is important to maintain the cleanliness of electrical equipment.
2. Describe the procedure for cleaning motors and generators used on your ship.

6.11 Transformers

1. What is the purpose of an electrical transformer? How does it work?
2. Provide the nameplate data for a large three-phase transformer on your ship, and define each item.
3. Explain the relations between line and phase voltage, and line and phase current for wye and delta connected three phase transformers.

6.12 Electrical Casualty

Discuss any major electrical casualty that occurred while you were aboard. What were the symptoms? What caused the casualty? How was it corrected?

7 Refrigeration and HVAC

This section of your sea project deals with the domestic refrigeration and air conditioning systems aboard your vessel. You must complete the required sections and at least one additional section.

7.1 Refrigeration Cycle - (SDG)

1. Select a refrigeration system found on your ship, and draw a sketch of the system. Include all major components such as: compressors, condensers, receivers, thermal expansion valves, pressure regulating valves, etc. Label the diagram with the names of the main components and the give the normal operating temperatures and pressures throughout the cycle, including the compressor cut-in and cut out pressures.
2. Describe the overall theory of operation of this cycle and give the purpose of the major system components.

7.2 Refrigeration System Operation

1. Describe the procedure for starting and changing over a cargo or stores refrigeration system.
2. Describe the procedure for adding oil to the refrigeration compressor.
3. Provide the specification for the ship's stores refrigeration boxes, including purpose, capacity, and normal operating box temperatures.
4. Describe the procedure used to defrosting refrigerated boxes.

7.3 Refrigerant Charging and Recovery

1. Describe the procedure for adding refrigerant to the system. Include safety aspects. Also include any recovery system on board for the reclaiming of refrigerants.
2. Describe the procedure and equipment used to find leaks in the refrigeration system. Include a job hazard analysis.
3. Describe the procedure for repairing leaks in the refrigeration system.

7.4 Refrigerated Ship

1. If you are aboard a refrigerated ship, or vessel with refrigerated cargo, provide a diagram and describe the cargo refrigeration system .
2. Describe any special operational considerations associated with the system.

7.5 Heating and Air Conditioning

1. Provide a system diagram and describe the air conditioning system aboard your vessel.
2. Describe how proper temperature and humidity are maintained in your stateroom.
3. Describe the operation of a typical room temperature control.

7.6 Unit Refrigerators

1. If you are aboard a vessel with unit refrigerators and air conditioners, describe these units and provide as much of the information from above as possible (including system diagrams)
2. Describe any special operational considerations associated with the system.

7.7 Ventilation System

1. Describe the ventilation system aboard the vessel. Your description should include:

    - number and location of fan rooms
    - the equipment found in a typical fan room
    - the air filtration equipment.
    - any automatic or manual controls provided.

8 Miscellaneous Subjects

This section is applicable to all vessels. On ships carrying multiple cadets, you must select sections that do not overlap with the other cadets aboard to the extent possible.

8.1 Bunkering - (SDG)

1. Describe the procedure for taking on fuel, including all precautions to prevent pollution of the marine environment.
2. Estimate the annual fuel cost of the vessel, based on the current price of fuel oil and the vessel's daily consumption.
3. Provide a photocopy of a fuel vendor's receipt showing viscosity, flash point, and grade of fuel, etc.

8.2 Oily Water Management - (SDG)

1. Discuss the method used for separating and disposing of bilge and other oil contaminated waters.
2. Include a photocopy of a blank or completed page from the Oil Record Book. Discuss record keeping requirements and how to fill out the ORB. Who is responsible for maintaining the ORB? Who actually makes the entries aboard your vessel? What are the consequences of failure to properly maintain the ORB?
3. Discuss MARPOL regulations concerning the disposal of oily bilge water.

8.3 Dead Ship Startup

Describe, in detail, steps to be taken to start the entire plant from a "dead ship" (no power) status up to the point of being ready to answer any and all bells. Assume that the vessel is fully fueled at the dock, but with no shore power or shore steam available. Include starting generators, air compressors, preparing main propulsion systems, etc.

8.4 Process Control

Choose a cooling water or heating system on your ship which is controlled by a PID controller, and:

1. Draw a block diagram of the control loop for the system you have chosen: Sensor, transmitter, controller, final control element, feedback, etc.
2. Describe in detail each of the elements in the loop. How are the signals transmitted around the loop?
3. Describe these different modes of control: On-off, Proportional, Proportional + Reset (PI) and PID. Which mode is used in the loop you have chosen?

8.5 Auxiliary Boilers

Describe any auxiliary boilers aboard your ship. Include:

1. Description of boiler and service.
2. Sketch or photocopy showing the internal construction of the boiler.
3. Maintenance requirements and responsibilities.
4. Any noteworthy features of boiler, system, or operation.

8.6 Auxiliary Diesels

Briefly describe all auxiliary diesels aboard your vessel (Generators, Air Compressors, etc. Exclude ship's service and emergency diesel generators). Include:

1. Purpose of the engine.
2. Brief description (Power, number of cylinders, Manufacturer, etc)
3. Engine particulars including all of the engine systems (Fuel, oil, water, starting…)
4. Any noteworthy features of the engine, system or operation.

8.7 Compressors

1. Describe briefly the various air compressors found aboard your ship including type, location, nameplate data and service.
2. Describe any equipment used to remove moisture or improve air quality.
3. Describe what routine maintenance the watch performs on the air compressors.

8.8 Centrifuge

Choose either a F.O. centrifuge or the L.O. centrifuge, and

1. Provide manufacturer's specs and diagrams of the centrifuge and its associated systems.
2. Describe its principles of operation.
3. Describe the starting, securing, and cleaning procedures; how often are they cleaned, and typical maintenance problems.

8.9 Evaporators

1. Provide a photocopy or drawing of the evaporators showing; manufacturer, the flow of all fluids entering and leaving the unit, temperatures and pressures.
2. Describe the principle of operation of the evaporator, and give a detailed starting procedure.
3. What are the watch and maintenance responsibilities concerning the proper operation of the evaporator? Under what conditions is the evaporator distillate pumped to the bilge?

8.10 Sewage and Sanitary Systems

1. Describe the sewage disposal system aboard your vessel including manufacturer's data, capacity, operating principles, chemicals used, and basic operation.
2. Describe the watch responsibilities associated with the system.
3. Discuss the MARPOL regulation that apply to your vessel regarding sewage disposal.

8.11 Pumps

Describe one pump in each of the following categories: centrifugal, rotary, reciprocating, propeller, jet, etc., if installed. For each pump type, include the following:

- name, classification, and manufacturer's specifications
- principle of operation
- typical applications for this type of pump
- starting procedure and routine maintenance.

8.12 Steering Gear

1. If your ship has a standard rudder steering control, provide diagrams and describe the operation of the equipment which controls the position of the rudder. Include:
    - Mechanical operation of the steering gear
    - Communications between bridge and steering engine
    - Equipment redundancy and emergency steering
    - Modes of steering including hand, gyro, and non-follow-up
    - Legal requirements for steering gear
2. Describe procedure used on your ship for testing the steering gear prior to getting underway.

8.13 Deck Machinery

1. Describe the various types of deck machinery found on your ship including anchor windlass, capstans, and winches.
2. Describe all special equipment and support equipment particular to your type of vessel (Cargo handling, UNREP, LNG, Dredge, Towing…).
3. Describe the maintenance, frequency, and responsibility for the above equipment.

8.14 Line Shaft Bearings

1. Describe the design and number of the line shaft bearings.
2. Describe what would probably be done if one was severely damaged.

8.15 Hydraulics

Select a significant hydraulic system aboard your vessel: crane, ramp, hatch covers, etc.

1. Provide a schematic diagram and describe the operation of the system.
2. Give details concerning the function and purpose of three major components of the system.
3. Discuss any routine maintenance requirements.

8.16 Incinerator

If your ship has an incinerator, describe it, including construction and operational details. Who normally runs it? Are there any restrictions for the use of the incinerator in port or at sea?

8.17 Water Treatment

1. Observe and assist with an Engineer in the testing and the treatment of the Main engine coolant or auxiliary boiler water. If possible, repeat on a number of continuous occasions to develop a sense of the continuity involved.
2. Describe the testing procedure and the purpose of the test.
3. Present a typical day's test results, analyze the results, and discuss the corrective actions to be taken.

8.18 Oil Analysis

1. Describe the procedure used aboard your vessel for lube oil and fuel oil analysis.
2. What properties are measured, and what are the consequences of out-of-range values?
3. Provide a photocopy of any oil analysis and discuss the results.

8.19 Ship's Construction

1. Provide a photograph or sketch, and a description of two structural pieces that add to the *longitudinal* strength of the ship. Do the same for the *transverse* strength of the ship.
2. Using the ship's plans, determine the hull plate thickness at three different levels of the ship, for example: bottom plating, mid hull, and sheer strake.
3. How many watertight bulkheads does your vessel have? Make a sketch showing the location of these bulkheads. Explain the purpose and legal requirements for watertight bulkheads.

8.20 Ship's Stability

1. Describe the types of information found in your ship's *Trim and Stability Booklet*. What is this information used for, and who uses it?
2. Provide a copy of one or more pages from the ship's *Hydrostatic Table*. and use it to calculate the ship's tonnage based on the ship's drafts from a recent port.
3. Determine if your ship has a loading or stability software program. Who is responsible for stability calculations? What is the required input for the program calculations? What kind of output does the program provide?
4. What is *Free Surface?* How does free surface affect the stability of the vessel? How does your ship calculate the free surface effect from all the liquid in the tanks onboard?

8.21 Corrosion

1. Give a brief description of the corrosion process of a metal.
2. Describe any methods utilized on your vessel to minimize the effects of corrosion.
3. Determine a location on your vessel which was subject to corrosion, and describe how it was corrected.

8.22 Shipyard

1. Describe the licensed engineers' role during the last major shipyard period and what repairs were done.
2. Describe what repairs need to be done during the next shipyard period and what preparations need to be done to accomplish these repairs. This information can be gathered through discussions with the Chief Engineer and First Assistant.

8.23 Maintenance Management

1. Describe any system or software used aboard to document completed maintenance tasks, and to schedule upcoming maintenance tasks.
2. Describe any predictive tests that are performed aboard your vessel to detect machinery failures before they happen.
3. Describe the system used aboard your vessel to store, manage, and obtain spare parts.

8.24 Major Casualties

1. Describe any major casualties that have occurred to the main plant in the last five years. Electrical casualties should be discussed in section 5.11.
2. Describe the process for repairing the casualty.
3. What types of machinery history records are kept?

8.25 Major Maintenance Project

If you participated in a extensive maintenance project or overhaul, describe the project and your experience.

Answer questions such as: Why was the project undertaken? What planning was done before the project began? What maintenance skills were required to complete the task? What difficulties were encountered? What did you learn from the experience?

8.26 Special Equipment - (Engine room related)

1. Discuss all special equipment aboard your vessel (Dredging, LNG, Container, RO-RO…), prime movers, operation, and controls. Keep these items separate from deck equipment!

8.27 Special Topics

You may use this section to describe any unique experience that occurred during your sea term. Some possible topics include:

- shipyard overhaul
- underway replenishment
- fire
- rescue.

8.28 Missing Question

Now's your chance. Help improve the sea project. I'm looking for good question on topics which are missing from the sea project – particularly in the areas of tugs and barges, maintenance, and automation.

For this section:

1. Write a question you think should be part of the sea project.
2. Answer it.

8.29 Scrapbook

1. Create a scrapbook containing ten or more clear photographs showing your vessel, equipment, or operations. Include at least one photo with you in it. Include a caption with each photo, containing the vessel name, the date photo was taken, and a description of what is shown in the photo, names of people, etc. Captions should be self explanatory, and be able to stand alone, outside of the project.

9 Tugs and Barges

If you are serving on an integrated or articulated tug and barge, the first three sections below are considered required.

9.1 Pinning System - (ATB)

Describe the system used to couple the tug and barge. Describe how the pin is extended and retracted, how force is applied to the helmet, and how the pin connects to the barge. In the event of a power loss, is there any way to manually extend or retract the pins?

Include a photograph and schematic diagram of one of the coupler units.

9.2 Barge - (ATB)

Describe the construction of the barge that the vessel is normally paired with. Include the type of hull design, material dimensions, number and layout of the cargo tanks.

How is power generated aboard the barge? Include a description of any generator engines on the barge.

Draw a simplified line drawing of the electrical distribution aboard the barge, including all generators, buses, shore power or tug connections, and major consumers of power. What is the largest circuit breaker found on the barge, describe the purpose, trip ratings and features.

9.3 Barge Operations - (ATB)

List all of the cargo pumps aboard the barge, noting the manufacturer, the type of pump and motor and what power is supplied to the motor. Include a piping diagram that shows cargo transfer lines, tank venting, and manifolds.

How is the barge cargo managed and monitored? Which crewmembers are in charge of putting product into certain tanks and maintaining proper on load or offload rates during cargo transfer?

Most barges feature a ballast system to maintain a certain draft while the vessel is on loading or offloading cargo. Describe how the ballast system is operated; including which crewmembers handle ballasting, what the tank layout for ballasting liquid is, and the type of ballast pumps that are used.

9.4 Line Handling

Describe the equipment and procedure for line handling and mooring operations aboard your vessel. Are the engineers involved? Describe the actual lines, including material, diameter and breaking strength? Provide a diagram giving the names and locations of the lines used to secure your vessel to the dock.

10 Rigs and OSV

If you are serving on an Mobile Offshore Drilling Unit or an OSV, you may answer any of these optional questions

10.1 Drilling

Discuss the equipment and the process used aboard your rig to drill for oil. What personnel are involved? Describe some of the hazards of this work.

How has the *Deepwater Horizon* spill affected operations at your company?

10.2 Mud

Describe what drilling mud is, what is it used for, and how is it managed. Provide a sketch and describe the basic mud circulating system.

10.3 Bulk Cargo

Describe how to load, store, and transfer dry bulk material such as cement and barite.

10.4 Dynamic Positioning

If your vessel uses dynamic positioning,

1. Describe the purpose of the system and the advantages/disadvantages of DP.
2. Briefly describe how the system works, including system inputs and outputs, and any redundancy or safety features.
3. Describe the duties and responsibilities of the dynamic positioning operator.

3

Additional Requirements

In addition to completing the Sea Project Assignment described in the preceding section, all students are also required to complete the additional requirements described in this section.

Include these items in order at the rear of your project.

A.1 Plates

You must select at least five systems appropriate to your type of vessel, personally trace them, then draw them with CAD. Along with each plate, include the rough sketch you made while tracing the system and a written description of the system. For grading purposes, each system is weighted the same as a written section.

Plates must be clearly labeled, use standard symbols, and include a title block containing the system name, your name, your ship's name, and the date the plate was drawn. Your description should include items such as normal operating temperatures and pressures, tank capacities, routine operational requirements, etc.

Systems to select from include:

- Lube Oil System
- Fuel Oil System
- Fuel Oil Transfer System
- Lube Oil System
- Sanitary System
- Cooling Water System
- Main Circulation System
- Main Condensate System
- Feedwater and Make-up Feed System
- Bilge system
- etc.

A.2 Daily Log

You are required to maintain a daily log of your engineering activities aboard the vessel. You do not need to include personal experiences, just your professional activities. The daily entries should include items like:

- work you completed
- significant events that took place aboard the vessel
- engineering problems or casualties were resolved
- engineering knowledge that you gained for the day
- work done on sea project
- any practical demonstrations completed.

A.3 Cadet Evaluation

Prior to leaving the vessel, you must get an evaluation from the chief engineer and any other engineering officers that you worked closely with. Have the officers use the *Cadet Evaluation* forms and envelope which were provided in the sea service packet that you received before you left the academy.

Evaluations should be submitted directly to Ms. Mulgrew in the placement office. Copies of the evaluations *may* be included in the project, but are not required.

A.4 MMD and Discharges

When you leave your ship, the captain will give you an official discharge certificate or sea service letter. These papers are used to document your sea time and prove your eligibility to sit for your license, and as such, are extremely important and must not be lost.

Place a **copy** of your discharge papers in your sea project, and deliver the **original** papers and your MMD to LCDR Huhnke as soon as possible after you return to the academy.

All original sea service letters, discharges and MMDs will be returned to you at graduation.

A.5 Letter to Department Chair

At the conclusion of your commercial shipping experience, you must write a letter to the Marine Engineering Program Coordinator discussing your views of the Commercial Shipping Program and the requirements of the Sea Term Project. Include any constructive recommendations for change or improvement.

Your letter should be correctly formatted as a formal business letter and include date, to address, from address, closing salutation, and your signature. Do not put your letter in an envelope, however.

Include **two copies** of this letter as part of your sea project; one will be delivered to the program coordinator, the other will remain with your project. Letters should be addressed to:

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LCDR Alan Gillis
Marine Engineering Program Coordinator
Massachusetts Maritime Academy
101 Academy Drive
Buzzards Bay, MA  02532
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A.6 Practical Demonstrations

You are required to keep a record of your shipboard practical experiences, by getting your officer's initials in the *Record of Shipboard Practical Demonstrations* booklet, whenever you observe, assist, or perform routine engineering operations. In addition, if your ship's officers deem you competent to carry out selected tasks, they can sign you off STCW assessments for you. These STCW demonstrations can be used to satisfy your STCW requirements on the 1/c cruise.

Before you get any officer's signatures in your book, make sure that they have read the letter to the ship's officers provided in the booklet, and have filled out the information in the front of the book. Get the initials contemporaneously with the actual experience, and make an entry in your daily log noting that a signoff was completed.

The *Record of Shipboard Practical Demonstrations* booket was given to you at the same time you received your sea project, and the original book must be turned in along with your project for credit. This booklet will not be returned.

4

Sea Project Grading Policy

All work submitted will be graded according to the *Written Work Rubric* below. The grades for individual sections defined in Section 2 will be weighted and totaled along with grades for the additional requirements found in Section 3. Any *Optional Sections* completed will be scored the same way and added to your point total as extra credit. Additional points are given or deducted for following directions in Section 1. Late submissions will have points deducted for each day late, up to a maximum of thirty days late. Letter grades will be assigned based on the total number of points given.

Written Work Rubric

Very Good (4 points)

Response is all of these:

- Complete – Gives all requested information in a thorough manner, and
- Original – the response appears to be the student's own writing, and
- Grammatically Correct – contains no spelling or grammar errors, and
- Technically Correct – No obvious technical errors, and
- Well structured – the paragraphs contain topic sentences and organization, and
- Neat – presents a professional appearance.

Good to Acceptable (3 points)

Answer nearly as described above but with one serious flaw such as:

- Response is somewhat less than thorough or correct, or
- Response does not include some requested information, or
- Response appears to be copied verbatim from technical manuals, or
- Response contains 1–2 grammar or spelling errors, or
- Response could be improved with editing.

Minimum Acceptable (2 points)

Response contains several flaws described above, or:

- Response is incomplete or skimpy in detail, or
- Response contains 3–4 grammar or spelling errors, or
- Response contains an obvious technical error or impossibility.

Poor (1 point)

Answer is worse than described above, for example:

- Response shows little or no effort, or
- Response fails to answer the question, or
- Response contains 5 or more grammar or spelling errors, or
- Response indicates hazardous behavior.

Worthless (0 points)

Section has no redeeming quality.

Missing (–1 point)

Required section is completely missing.