SEA TERM 2016
Engineering
Watchstanding Manual

Massachusetts Maritime Academy

Buzzards Bay, Massachusetts

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General Instructions for Engineering Watches

The following general instructions will be adhered to by all engineering cadets.

- **Safety is the first priority in the Engine Room.**
- Thoroughly know and understand your watch responsibilities and the responsibilities of all cadets under your supervision.
- Prior to taking over a watch:
  - Make a thorough round of all spaces and machinery for which you are responsible.
    - Understand all special instructions pertaining to your watch.
    - Understand all unusual operating conditions pertaining to your watch.
    - Insure that all is in proper working order.
- Report to your supervisor when you have relieved the watch.
- All commands are to be repeated.
- Do not attempt to carry out an order that you do not completely understand.
  - This is a learning environment so **ASK QUESTIONS.**
- All cadets on watch are responsible for memorizing the information contained on the engine room status board.
- Cadets are not to enter the engine room unless they are properly attired, and carrying the required safety gear and tools.
- Logbooks:
  - Make no erasures in any log book or log sheet.
  - Delete mistakes with a single line and initial.
  - Keep all logbooks clean.
  - Keep the logbook closed when not in use.
- Answer phones properly by giving your class, name and position, i.e.,1st Class Lima, C/E).
- Pass on all pertinent data and changes in standard routine to the relieving watch.
- Watch decorum prohibits running, shouting, sitting down or reading.
- No horseplay is permitted on watch.
- Watch stations are to be kept in a neat and orderly condition.
- Drip pans, boiler casings, machinery, deck plates, etc., are to be kept clean and oil free. The watch is not to be relieved until all spilled oil and water has been wiped up.
- Do not prop open or otherwise render inoperative fire doors.
- Upper class cadets are to make a conscious effort to assist with the training of the underclass.
- Cadets in supervisory positions are responsible for the safety of their assigned personnel.
- Cadets will not leave their watch station until properly relieved.
- Nothing in these regulations is intended or should be construed as limiting the authority or responsibility of the watch from operating a safe and efficient plant.

STCW Watchstanding Requirements

The STCW 95 Convention lays out specific requirements for standing in-port and at sea engineering watches. Watch standers must read, understand and obey the principles defined by the convention. Your attention is directed particularly to Section A-VIII/2. Excerpts from the STCW Code are located in the back of this manual for easy reference.

- Part 3-2 *Principles to be observed in keeping an engineering watch.*
- Part 4-2 *Taking over the engineering watch.*
- Part 4-4 *Performing the engineering watch.*

Engineering Watch Relieving Procedure

The following procedure will be followed by all cadets when relieving the watch for scheduled sea watches.

1. Cadets of the oncoming watch will muster in the upper-tween deck passageway 30 minutes before the

watch is scheduled to begin, i.e. at 1130 for the 1200-1600 watch, 1530 for the 1600-2000 watch, etc.

2. The Senior Training Rate, or the Senior Plant Oiler if there is no Senior Training Rate, will take an accurate muster, and inspect each cadet going on watch for proper attire, including all required safety gear and tools.
3. The Senior Training Rate will give the muster report to the Watch Officer in attendance, who will pass on any special instructions to the watch.
4. The Senior Training Rate will dismiss the watch to report to the engine room.
5. Cadets will report to their stations to be briefed by their counterparts of the previous watch. ***This is not the time to be learning the duties of your watch.***
6. 1/c, 2/c & 3/c cadets are expected to know their assignments and rounds prior to their watch. Cadets that are unprepared for their watch will be assessed negative watch standing points for that watch.
7. When the oncoming watch is fully briefed, the underclass shall report to their 1/c supervisor (Senior Watertender, Senior Oiler, etc) to be dismissed.
8. 1/c supervisors will report to the Cadet Engineer when all their charges have been properly relieved, then report to the Senior Watch Officer to be dismissed from the engine room.
9. Under no circumstances are watch personnel to leave their designated posts before they are properly relieved.
10. The relieved watch standers shall muster in the upper tween deck passageway outside of the engine room for a watch debrief. The debrief and muster shall be held by either the CE or the Senior Training Rate of the Watch.

Required Equipment for the Engine Room.

For safety and accountability purposes, all cadets will comply with regulations listed below whenever they enter the engine room.

Whenever you enter the engine room, you must have:

- Long sleeve boiler suit.
- Your last name clearly displayed over your shirt pocket.
- Steel-toed work shoes.
- Working flashlight with plastic housing. Mini-Mag-lights and metal cased lights are not authorized.
- Hearing Protection.
- Hard Hat of proper class color.

Cadets on watch must have, in addition to the above:

- Work gloves.
- Adjustable wrench and adjustable pliers.
- Pen and pocket notebook.
- Knife

The Engineering Watch/Training Officer will check for required gear when the watch is mustered, and failure to comply may result in reduced watch grade, or demerits.

The Engineering Watch / Training Cadets should also be aware of the underclassmen's adherence to proper watch equipment, watch reliving procedures etc. If appropriate procedures are not followed, instruction should be given as well appropriate disciplinary actions depending upon the frequency and or nature of said offense.

Engineering Watch Job Descriptions

Cadet Engineer

The cadet engineer is the senior engineering cadet on watch, and as such is in overall charge of the engine room. He/she is directly responsible to the Senior Watch Officer for the conduct of the watch and the operation of the ship's power plant, including auxiliary machinery manned by personnel of his/her watch section. The Cadet Engineer is expected to be aware, at all times, of every aspect of the plant's operation.

Specific Duties and Responsibilities

1. Make a thorough round of all machinery in your charge before taking over the watch. When all is found to be in good order, notify the Cadet Engineer of the off-going watch that you are ready to take over the watch.
2. If practical, make rounds of the engine room throughout the watch.

3. Know the status of the engine room. Know which machinery is in operation, which settler is in use, the current source of make-up and potable water, and to where the evaporators are discharging.
4. Remain in the area of the main operating platform to observe the main gauge board, drum levels, etc., and to answer the telephone. When the Cadet Engineer leaves the operating platform to make rounds, or for any other reason, he shall direct the Cadet Engineer Assistant to maintain the watch on the platform. The operating platform shall be manned at all times.
5. Prepare the plant for getting underway or maneuvering, when required.
6. Insure that the engine room logbook is maintained. At the end of each watch, the C/E will calculate the RPM's, and sign the logbook. At this time, the bridge will be notified of the sea temperature and the RPM's. The 0800-1200 C/E will carry the logbook to the Chief Engineer's room each day at noon. **Keep the logbook clean.**
7. At all times, know the whereabouts of the Watch Engineer, and inform him/her before making any changes in the operational status of the plant.
8. In the event of deviation from normal operating conditions, consult with the Watch Engineer and make the appropriate corrective action. Notify the bridge of any emergency condition that requires a change in the main engine speed.
9. Pass on all pertinent data, changes from standard routine, casualties, or abnormal events to the relieving watch.

Boiler Engineer (Senior Water-tender)

The Senior Water-tender is responsible to the Cadet Engineer for the proper operation of the boilers, fireroom, and main feed system.

Specific Duties and Responsibilities:

1. Prior to taking over the watch, make a thorough inspection of the boilers, forced draft fans, fuel oil service system, and feed water system.
2. Be aware, at all times, of the water levels in both boilers. Investigate any high or low-level alarms.
3. Supervise all boiler operations, such as changing and cleaning burners, changing and cleaning fuel oil strainers, intermittent firing, etc. **Insure that the licensed watch officer is notified whenever these operations are conducted.**
4. Instruct Third Class firemen and Fourth Class port & starboard wipers in boiler operations and related topics.
5. Know what to do in the event of the following casualties: high water, low water, flame failure, fuel oil pump failure, forced draft fan failure, feed pump failure, loss of control air, etc.
6. Regulate fuel oil heaters and steam to the settlers to maintain desired fuel oil temperature.
7. Switch settlers when required.
8. Keep status boards current.
9. Immediately notify the Cadet Engineer of any deviations from normal operating conditions.

Upper CE

The Upper CE must have knowledge of all main engine room systems, with emphasis on the engine room operating level and upper levels, as to their operation under routine and emergency conditions. All normal temperatures, pressures, and levels are to be monitored continuously. Thorough knowledge of standing orders and watch duties of all personal under his/her supervision is also expected. The Upper CE is directly responsible to the Cadet Engineer of the Watch, as well as the Watch Engineer. He/she will assist in the supervision of all machinery spaces.

Specific Duties and Responsibilities

1. Before relieving the watch, make a through inspection of all machinery and areas for which he/she is responsible. Thereafter, make continuous rounds.
2. Supervise the performance of underclass watch personal and instruct them in correct watch procedures in accordance with the watch descriptions.
3. Assist the Cadet Engineer of the Watch in supervising the performance of all cadets on the watch on following posted General, Standing and Special Orders.
4. Immediately report any deviations from normal operating conditions to the Cadet Engineer of the Watch and the Watch Engineer.
5. Be thoroughly acquainted with posted general, standing, and special orders.

6. The proper operation and inspection of the following machinery is specifically the responsibility of the Upper CE:
    a. Turbo-generators
    b. Auxiliary steam system
    c. Air handlers and receivers
    d. Safety/Fire equipment (i.e.. semi-portable CO_2, eye wash stations, etc)
    e. All pumps and equipment on the operating and upper levels

Lower CE

The Lower CE must have knowledge of all main engine room systems, with emphasis on the engine room lower level, as to their operation under routine and emergency conditions. All normal temperatures, pressures, and levels are to be monitored continuously. Thorough knowledge of standing orders and watch duties of all personal under his/her supervision is also expected. The Lower CE is directly responsible to the Cadet Engineer of the Watch, as well as the Watch Engineer. He/she will assist in the supervision of all machinery spaces, particularly the engine room lower level, and AMR.

Specific Duties and Responsibilities

1. Before relieving the watch, make a through inspection of all machinery and areas for which he/she is responsible, including shaft alley. Thereafter, make continuous rounds.
2. Supervise the performance of underclass watch personal and instruct them in correct watch procedures in accordance with the watch descriptions.
3. Assist the Cadet Engineer of the Watch in supervising the performance of all cadets on the watch on following posted General, Standing and Special Orders.
4. When inspecting motor centrifugal pumps, check the following: excessive motor and pump bearing temperatures, suction and discharge pressures, vibration, any abnormal noise, general pump leakage and motor temperatures.
5. Immediately report any deviations from normal operating conditions to the Cadet Engineer of the Watch and the Watch Engineer.
6. Ensure that all potable and distillate tanks as well as the evaporator distillate salinity test are within limits.
7. Always be aware of the level in the potable water tanks.
8. Operate bilge pump as required to maintain all bilges in a dry condition. Always request permission of the Watch Engineer to pump bilges, and be sure to meet oil pollution standards.
9. Be thoroughly acquainted with posted general, standing, and special orders.
10. When inspecting reciprocating pumps carefully check for the following: excessive gland leakage, loose linkage, pounding and groaning, suction and discharge pressure, proper lubrication and proper stroke.
11. The proper operation and inspection of the following machinery is specifically the responsibility of the Lower CE:
    a. Make-up feedwater, evaporator systems, and reserve feed system.
    b. Fresh water system, main and aux. feed, main and aux. circ.
    c. Main feed pumps and all auxiliary pumps in the engine room, fuel oil service pumps and fuel oil transfer pumps.
    d. Steam reducing stations in the engine room
    e. All pumps and equipment on the lower level
    f. Safety/Fire equipment (i.e. portable fire extinguishers, eye wash stations, etc)

Auxiliaries Engineer (AMR CE)

The AMR CE must have knowledge of all auxiliary systems, with emphasis on those in the AMR, as to their operation under routine and emergency conditions. All normal temperatures, pressures, and levels are to be monitored continuously. Thorough knowledge of standing orders and watch duties of all personal under his/her supervision is also expected. The AMR CE is directly responsible to Cadet Engineer of the Watch, as well as the Watch Engineer. He/she will assist in the supervision of all machinery spaces, particularly the AMR.

Specific Duties and Responsibilities

1. Before relieving the watch, make a through inspection of all machinery and areas for which he/she is responsible (including steering gear). Thereafter, make continuous rounds.

2. Supervise the performance of underclass watch personal and instruct them in correct watch procedures in accordance with the watch descriptions.
3. Assist the Cadet Engineer of the Watch and Lower CE in supervising the performance of all cadets on the watch on following posted General, Standing, and Special Orders.
4. Immediately report any deviations from normal operating conditions to the Cadet Engineer of the Watch and the Watch Engineer.
5. Ensure that all potable and distillate tanks as well as the evaporator distillate salinity test are within limits.
6. Always be aware of the level in the potable water tanks.
7. Be thoroughly acquainted with posted general, standing, and special orders.
8. The proper operation and inspection of the following machinery is specifically the responsibility of the AMR CE:

    a. A/C Chiller Systems
    b. Fresh water system, SW service pumps, main and aux. circ.
    c. SSDG
    d. MSDs
    e. Nyrex Evaporator
    f. All pumps and equipment in the AMR
    g. USB room (Main Deck, port side)
    h. Oil handling room
    i. Safety/Fire Equipment (i.e. eye wash stations, extinguishers, etc)

Senior Oiler

The Senior Oiler is directly responsible to the Cadet Engineer for the proper operation of all machinery inside and outside of the engine room.

Specific Duties and Responsibilities

1. Make a thorough inspection of all engine room machinery and spaces before relieving the watch. Make a report of the condition of the engine room to the Cadet Engineer.
2. Thereafter, make hourly rounds of the machinery under your jurisdiction, checking in particular for: excessive motor, bearing, gland, or motor controller temperature; vibrations, abnormal noises, improper commutation; loose, stuck, or broken linkages; excessive leakage from glands or other sources; and checking in general for any unusual or abnormal conditions.
3. The correct lubrication of all equipment in and out of the engine room is the specific responsibility of the Senior Oiler. The oil levels in the following equipment shall be checked at least twice each watch: main engine sump, turbo-generator sumps, feed pumps, forced draft fans, air preheaters, air compressors, lube oil purifier, line shaft bearings, and steering gear. Reciprocating equipment is to be properly lubricated at all times while operating. If a piece of equipment is found to be in need of lubrication, the Senior Oiler will determine the correct type of oil to use, and then assist the appropriate Sophomore Oiler in the addition of this oil.
4. During maneuvering periods, the Senior Oiler will make continuous rounds of the engine room, paying particular attention to the main engine lube oil system, main generator lube oil system, electrical load, spring bearings, and all condenser vacuums and condensate levels.
5. Start and secure auxiliary equipment as directed by the Cadet Engineer.
6. Maintain the engine room status board. All entries are to be updated at the end of each watch.
7. The Senior Oiler will supervise and instruct the Plant Oiler, Upper Oiler, Lower Oiler, and their respective Wipers, and insure that they carry out their duties properly.
8. Know, and be prepared to carry out, the duties of any or all of these positions if necessary.
9. At the end of each watch, collect the Oiler log sheets from the Sophomore Oilers and check each for unusual readings. After they have been checked, the log sheets are to be taken to the Cadet Engineer for his use in filling out the logbook
10. At exactly twenty minutes before the end of the watch (and also at arrival, departure, stand-by, FWE, and emergency bells) take the counter and meter readings and bring them to the Cadet Engineer.
11. Report any problems or deviations from normal operating conditions to the Cadet Engineer immediately.
12. The 04-08 and 16-20 Senior Oiler are responsible to collect all of the previous twelve hour watches' log sheets and staple them with a cover page and place them in the log bin.

Refrigeration Engineer

The Refrigeration Engineer is responsible to the Cadet Engineer for the proper operation of the ship's refrigeration and air conditioning equipment.

Specific Duties and Responsibilities

1. Prior to taking over the watch, make a thorough round of all ship's refrigeration and air conditioning machinery, to include all applicable equipment in the AMR, and check the refrigeration boxes. When all is determined to be in good order, notify the Cadet Engineer.
2. Continuously monitor the ship's refrigeration and air conditioning equipment. Pay particular attention to: compressor lubrication, motor operation, suction and discharge pressures, cooling water supply, brine and scuttlebutt system temperatures.
3. Supervise and instruct the Refrigeration Oiler and Wiper in the performance of their duties, and the operation of the equipment, and ensure the logs are maintained properly.
4. Be informed of all instructions and special orders left by the Cadet Refrigeration Rates, Cadet CE, Chief Engineer, Refrigeration Engineer and/or Watch Officers. Pass on all pertinent data and changes from standard routine to the relieving watch.

Evaporator Engineer

The Evaporator Engineer is responsible to the Cadet Engineer for the proper operation of the ship's evaporator equipment.

Specific Duties and Responsibilities

1. Prior to taking over the watch, make a thorough round of all ship's evaporators, to include all applicable equipment in the AMR, and check all water fill operations. When all is determined to be in good order, notify the Cadet Engineer.
2. Continuously monitor the evaporator equipment throughout the watch. Inspect motor driven centrifugal pumps carefully for the following: excessive pump-gland leakage, excessive gland temperature, proper suction and discharge pressures, proper motor temperature and commutation, excessive noise or vibrations, etc.
3. Supervise and instruct the Evaporator Oiler and Wiper in the performance of their duties, and the operation of the equipment.
4. Ensure that evaporator logs are maintained properly. Ensure that meter readings are taken whenever the evaporator discharge is switched from one tank to another, and log this information each time a change is made. Log all chemicals added, and the results of all tests performed. Maintain the noon-to-noon summary sheets as provided.
5. Be aware, at all times, of the potable, and reserve feed tank levels. Know which tank is being filled, and which tanks are being used for potable water and make up feed suctions. Keep the status board up-to-date.
6. Be informed of all instructions and special orders left by the Cadet Evaporator Rates, Cadet CE, Chief Engineer, Refrigeration Engineer and/or Watch Officers. Pass on all pertinent data and changes from standard routine to the relieving watch.

Assistant Cadet Engineer

The Assistant C/E is directly responsible to the Cadet Engineer.

Specific Duties and Responsibilities

1. Know and understand the duties and responsibilities of the Cadet Engineer.
2. Make the Cadet Engineer rounds every hour on the half hour. Make a condition report to the Cadet Engineer at the conclusion of each round.
3. Man the maneuvering platform in the absence of the Cadet Engineer.
4. Take bells during maneuvering periods.
5. Assist the Cadet Engineer as directed.

Sounding & Security

The Sounding & Security Engineer is directly responsible to the Cadet Engineer.

Specific Duties and Responsibilities

1. Make rounds of 3 hold, 4 hold (AMR), Engine Room, Shaft Alley, 5 hold ,6 hold and Steering Gear Room. Note the level of water in all of the bilge wells. Assist as required to remove the water from the wells.

2. The above rounds of the Holds and Spaces are to be completed with the assistance of Upper Oiler of the watch. Always travel in pairs while making these rounds.
3. Provide the Cadet Engineer of the watch with the soundings / reading of the round to be entered into the Log Book. Report any problems to the Officer of the watch and the Cadet Engineer of the watch.
4. Over see the Evacuation Drills during the watch when the Watch Engineer initiates a drill. Take the required muster and complete the necessary reports as per standing orders. Deliver the completed reports as required to the Chief Engineers office on Boat Deck, Midship House.

Port & Starboard Fireman

The port and starboard Firemen are responsible to the Boiler Engineer (Water-tender) for carrying out boiler operations.

Specific Duties and Responsibilities

1. Carry out boiler operations as directed by the Senior Water-tender.
2. Monitor the boiler flames continuously to detect sputtering, hissing or flame failure, and to look for proper flame color and shape. Watch the periscopes for smoke.
3. Watch boiler water levels on the eye-high indicators. Operate the main and auxiliary check valves in high and low water emergencies.
4. Instruct the Port and Starboard Wipers in boiler operations.
5. Immediately report any deviations from normal operating conditions to the Senior Boiler Engineer.

Upper Oiler

The Upper Oiler is responsible to the Senior Oiler for all equipment and machinery on the main operating level and above.

Specific Duties and Responsibilities

1. Make a thorough inspection round of all machinery in the upper engine room hourly. Each hour, fill the correct readings into the Upper Oiler's log sheet. At the end of the watch, deliver the log sheet to the Senior Oiler. Pay particular attention to the main engine and related equipment.
2. Add oil to machinery when so directed by the Senior Oiler.
3. Blow down the compressed air receiver hourly.
4. Supervise the Upper Wiper in the performance of his duties, and instruct him in the duties of the Upper Oiler.
5. Immediately report any deviations from normal operating conditions to the Senior Oiler.

Lower Oiler

The Lower Oiler is responsible to the Senior Oiler for all machinery and equipment in the lower engine room and shaft alley.

Specific Duties and Responsibilities

1. Make a thorough inspection round of all machinery in the lower engine room hourly. Each hour, fill the correct readings into the Lower Oiler's log sheet. At the end of the watch, deliver the log sheet to the Senior Oiler.
2. Adjust the cooling water flow to the main lube oil coolers as necessary to maintain 110° oil to the main engine.
3. Add oil to machinery as directed by the Senior Oiler. Keep the linkages of operating reciprocating pumps properly lubricated.
4. Supervise the Lower Wiper in the performance of his duties, and instruct him in the duties of the Lower Oiler.
5. Immediately report any deviations from normal operating conditions to the Senior Oiler.

Refrigeration/AC Oiler

The Refrigeration/AC Oiler is responsible to the Senior Refrigeration/AC Engineer for assistance in the operation of the ship's refrigeration and air conditioning equipment.

Specific Duties and Responsibilities

1. Make hourly rounds of the refrigeration storage boxes. Record the box temperatures, along with the glycol system temperatures, for entry in the refrigeration log.

2. Make hourly rounds of the operating air conditioning compressor. Record operating conditions on the air conditioning log.
3. At the end of the watch, carry the refrigeration/air conditioning log to the Cadet Engineer to be checked and initialed.
4. Assist the Senior Refrigeration/AC Engineer as directed.
5. Supervise the Refrigeration/AC Wiper in the performance of his duties, and quiz him on the operation of the refrigeration and ship's air conditioning cycle.
6. Immediately report any deviations from normal operating conditions to the Senior Refrigeration Engineer.

Evaporator Oiler

The Evaporator Oiler is responsible for assisting the Evaporator Engineer with the operation of the ship's evaporators.

Specific Duties and Responsibilities

1. Make hourly rounds of the evaporator equipment, and continuously monitor system operation.
2. Monitor the salinity indicators, and make regular chemical analysis of the distillate. Insure that no distillate with excessive salinity is discharged to the tanks. Maximum chloride limits are 0.4 grains per gallon to the distilled and reserve feed tanks and 0.8 grains per gallon to the potable tanks.
3. Maintain the evaporator chemical feed tank. Fill when necessary with the proper mixture according to the posted instructions.
4. Change over tank suctions and discharges, and sound tanks as directed by the Senior Evaporator Engineer. Note the distillate meter reading each time tank valves are charged.
5. Check the MSD when sounding potable tanks.
6. Assist the Senior Evaporator Engineer as directed.

Plant Oiler

The Plant Oiler is responsible to the Senior Oiler for assistance in the operation of the Engine Room equipment.

Specific Duties and Responsibilities

1. Make hourly rounds of the Engine Room. Record operating conditions on the Plant Oiler's Log
2. At the end of the watch, carry the log to the Cadet Engineer to be checked and initialed.
3. Assist the Senior Oiler as directed.
4. Immediately report any deviations from normal operating conditions to the Senior Oiler.

AMR Oiler

The AMR Oiler is responsible to the Senior AMR Engineer for assistance in the operation of the auxiliary machinery room equipment.

Specific Duties and Responsibilities

1. Make hourly rounds of the AMR and record operating conditions in the AMR Log.
2. Assist the Senior AMR Engineer as directed.
3. Immediately report any deviations from normal operation conditions to the Cadet Engineer.

TG/SSDG Oiler

The TG/SSDG Oiler is responsible to the Upper CE for assistance in the operation of the power generating equipment.

Specific Duties and Responsibilities

1. Make hourly rounds of the operating generators, as well as Emergency Diesel Generator. Record operating conditions on the TG/SSDG Oiler's Log
2. At the end of the watch, carry the log to the Cadet Engineer to be checked and initialed.
3. Assist the Senior Oiler as directed.
4. Immediately report any deviations from normal operating conditions to the Senior Oiler or Cadet Engineer.

Underway

The following information shall be recorded at standby for getting underway, departure, standby for entering port, and finished with engines:

- Time
- F.O. meter reading

- Signal Received
- Main Engine shaft counter reading

The following orders will be entered symbolically as found in the bell book:

- Dead Slow Ahead
- Slow Ahead
- Half Ahead
- Full Ahead
- Stop
- Dead Slow Astern
- Slow Astern
- Half Astern
- Full Astern

Standing Orders and Night Orders

Standing Orders and Night Orders are maintained by the Chief Engineer and kept at the log desk. Every cadet on watch is responsible to read, understand, and follow the Standing and Night Orders.

Engineering Log Sheets

The following Engineering Log Sheets are to be maintained during each watch. The Log Sheets shall be provided by the Engineering Adjutant each day. The Adjutant shall review each sheet for standards and shall file same in the Engineering Training Office each day.

Copies of each sheet may be obtained in the Engineering Training Office. It is the responsibility of each cadet to familiarize themselves with each log sheet and the location of all data required for each log.

- Flash Evaporator Log
- Nyrex Evaporator Log
- Refrigeration Oiler Log - Ship's Service System
- A/C Chillers Log
- Old House Air Conditioning Log
- Lower Oiler Log
- AMR Oiler Log (2 Pages)
- STBD Fireman Log
- PORT Fireman Log
- Upper Oiler Log
- TG/SSDG Oiler Log (2 Pages)
- Plant Oiler Log (2 Pages)

Excerpts From The STCW Code Regarding Engineering Watchkeeping

Section A - VIII/1

Fitness for duty

1. All persons who are assigned duty as officer in charge of a watch or as a rating forming part of a watch shall be provided a minimum of 10 hours of rest in any 24-hour period.
2. The hours of rest may be divided into no more than two periods, one of which shall be at least 6 hours in length.
3. The requirements for rest periods laid down in paragraphs 1 and 2 need not be maintained in the case of an emergency or drill or in other overriding operational conditions.
4. Notwithstanding the provisions of paragraphs 1 and 2, the minimum period of ten hours may be reduced to not less than 6 consecutive hours provided that any such reduction shall not extend beyond two days and not less than 70 hours of rest are provided each seven day period.
5. Administrations shall require that watch schedules be posted where they are easily accessible.

Section A - VIII/2

Watchkeeping arrangements and principles to be observed

PART 1 - CERTIFICATION

6. The officer in charge of the engineering watch shall be duly qualified in accordance with the provisions of chapter III, or chapter VII appropriate to the duties related to engineering watchkeeping.

PART 3 - WATCHKEEPING AT SEA

Principles applying to watchkeeping generally

8. Parties shall direct the attention of companies, masters, chief engineer officers and watchkeeping personnel to the following principles which shall be observed to ensure that safe watches are maintained at all times.
9. The master of every ship is bound to ensure that watchkeeping arrangements are adequate for maintaining a safe navigational watch. Under the master's general direction, the officers of the navigational watch are responsible for navigating the ship safely during their periods of duty, when they will be particularly concerned with avoiding collision and stranding.
10. The chief engineer officer of every ship is bound, in consultation with the master, to ensure that watchkeeping arrangements are adequate to maintain a safe engineering watch.

Protection of marine environment

11. The master, officers and ratings shall be aware of the serious effects of operational or accidental pollution of the marine environment and shall take all possible precautions to prevent such pollution, particularly within the framework of relevant international and port regulations.

PART 3-2 - Principles to be Observed in Keeping an Engineering Watch

7. The term *engineering watch* as used in parts 3-2, 4-2 and 4-4 of this section means either a person or a group of personnel comprising the watch or a period of responsibility for an officer during which the physical presence in machinery spaces of that officer may or may not be required.
8. The *officer in charge of the engineering watch* is the chief engineer officer's representative and is primarily responsible, at all times, for the safe and efficient operation and upkeep of machinery affecting the safety of the ship and is responsible for the inspection, operation and testing, as required, of all machinery and equipment under the responsibility of the engineering watch.

Watch arrangements

9. The composition of the engineering watch shall, at all times, be adequate to ensure the safe operation of all machinery affecting the operation of the ship, in either automated or manual mode and be appropriate to the prevailing circumstances and conditions.

55. When deciding the composition of the engineering watch, which may include appropriately qualified ratings, the following criteria shall be taken into account:
    1. the type of ship and the type and condition of the machinery;
    2. the adequate supervision, at all times, of machinery affecting the safe operation of the ship;
    3. any special modes of operation dictated by conditions such as weather, ice, contaminated
    4. the qualifications and experience of the engineering watch;
    5. the safety of life, ship, cargo and port, and protection of the environment;
    6. the observance of international, national and local regulations; and
    7. maintaining the normal operations of the ship.

Taking over the watch

56. The officer in charge of the engineering watch shall not hand over the watch to the relieving officer if there is reason to believe that the latter is obviously not capable of carrying out the watchkeeping duties effectively, in which case the chief engineer officer shall be notified.

57. The relieving officer of the engineering watch shall ensure that the members of the relieving engineering watch are apparently fully capable of performing their duties effectively.

58. Prior to taking over the engineering watch, relieving officers shall satisfy themselves regarding at least the following:
    1. the standing orders and special instructions of the chief engineer officer relating to the operation of the ship's systems and machinery;
    2. the nature of all work being performed on machinery and systems, the personnel involved and potential hazards.
    3. the level and, where applicable, the condition of water or residues in bilges, ballast tanks, slop tanks, reserve tanks, fresh water tanks, sewage tanks and any special requirements for use or disposal of the contents thereof;
    4. the condition and level of fuel in the reserve tanks, settling tank, day tank and other fuel storage facilities;
    5. any special requirements relating to sanitary system disposals;
    6. condition and mode of operation of the various main and auxiliary systems, including the electrical power distribution system;
    7. where applicable, the condition of monitoring and control console equipment, and which equipment is being operated manually;
    8. where applicable, the condition and mode of operation of automatic boiler controls such as flame safeguard control systems, limit control systems, combustion control systems, fuel-supply control systems and other equipment related to the operation of steam boilers;
    9. any potentially adverse conditions resulting from bad weather, ice, contaminated or shallow water;
    10. any special modes of operation dictated by equipment failure or adverse ship conditions;
    11. the reports of engine-room ratings relating to their assigned duties;
    12. the availability of fire-fighting appliances; and

13. the state of completion of engine-room log.

Performing the engineering watch

2. The officer in charge of the engineering watch shall ensure that the established watchkeeping arrangements are maintained and that under direction, engine-room ratings, if forming part of the engineering watch, assist in the safe and efficient operation of the propulsion machinery and auxiliary equipment.
3. The officer in charge of the engineering watch shall continue to be responsible for machinery-space operations, despite the presence of the chief engineer officer in the machinery spaces, until specifically informed that the chief engineer officer has assumed that responsibility and this is mutually understood.
4. All members of the engineering watch shall be familiar with their assigned watchkeeping duties. In addition, every member shall with respect to the ship they are serving in have knowledge of:
   4.1. the use of appropriate internal communication systems;
   4.2. the escape routes from machinery spaces;
   4.3. the engine-room alarm systems and be able to distinguish between the various alarms with special reference to the fire extinguishing media alarm; and
   4.4. the number location and types of fire-fighting equipment and damage control gear in the machinery spaces, together with their use and the various safety precautions to be observed.
5. Any machinery not functioning properly, expected to malfunction or requiring special service, shall be noted along with any action already taken. Plans shall be made for any further action if required.
6. When the machinery spaces are in the manned condition, the officer in charge of the engineering watch shall at all times be readily capable of operating the propulsion equipment in response to needs for changes in direction or speed.
7. When the machinery spaces are in the periodic unmanned condition, the designated duty officer in charge of the engineering watch shall be immediately available and on call to attend the machinery spaces.
8. All bridge orders shall be promptly executed. Changes in direction or speed of the main propulsion units shall be recorded, except where an Administration has determined that the size or characteristics of a particular ship make such recording impracticable. The officer in charge of the engineering watch shall ensure that the main propulsion unit controls, when in the manual mode of operation, are continuously attended under stand-by or maneuvering conditions.
9. Due attention shall be paid to the ongoing maintenance and support of all machinery, including mechanical, electrical, electronic, hydraulic and pneumatic systems, their control apparatus and associated safety equipment, all accommodation service systems equipment and the recording of stores and spare gear usage.
10. The chief engineer officer shall ensure that the officer in charge of the engineering watch is informed of all preventive maintenance, damage control, or repair operations to be performed during the engineering watch. The officer in charge of the engineering watch shall be responsible for the isolation, by-passing and adjustment of all machinery under the responsibility of the engineering watch that is to be worked on, and shall record all work carried out.
11. When the engine-room is put in a stand-by condition, the officer in charge of the engineering watch shall ensure that all machinery and equipment which may be used during maneuvering is in a state of immediate readiness and that an adequate reserve of power is available for steering gear and other requirements.
12. Officers in charge of an engineering watch shall not be assigned or undertake any duties which would interfere with their supervisory duties in respect of the main propulsion

system and ancillary equipment. They shall keep the main propulsion plant and auxiliary systems under constant supervision until properly relieved, and shall periodically inspect the machinery in their charge. They shall also ensure that adequate rounds of the machinery and steering gear spaces are made for the purpose of observing and reporting equipment malfunctions or breakdowns, performing or directing routine adjustments, required upkeep and any other necessary tasks.

13. Officers in charge of an engineering watch shall direct any other member of the engineering watch to inform them of potentially hazardous conditions which may adversely affect the machinery or jeopardize the safety of life or of the ship.
14. The officer in charge of the engineering watch shall ensure that the machinery space watch is supervised, and shall arrange for substitute personnel in the event of the incapacity of any engineering watch personnel. The engineering watch shall not leave the machinery spaces unsupervised in a manner that would prevent the manual operation of the engine-room plant or throttles.
15. The officer in charge of the engineering watch shall take the action necessary to contain the effects of damage resulting from equipment breakdown, fire, flooding, rupture, collision, stranding, or other cause.
16. Before going off duty, the officer in charge of the engineering watch shall ensure that all events related to the main and auxiliary machinery which have occurred during the engineering watch are suitably recorded.
17. The officer in charge of the engineering watch shall cooperate with any engineer in charge of maintenance work during all preventive maintenance, damage control or repairs. This shall include but not necessarily be limited to:
    - 17.1. isolating and bypassing machinery to be worked on;
    - 17.2. adjusting the remaining plant to function adequately and safely during the maintenance period;
    - 17.3. recording, in the engine-room log or other suitable document, the equipment worked on and the personnel involved, and which safety steps have been taken and by whom, for the benefit of relieving officers and for record purposes; and
    - 17.4. testing and putting into service, when necessary, the repaired machinery or equipment.
18. The officer in charge of the engineering watch shall ensure that any engine-room ratings who perform maintenance duties are available to assist in the manual operation of machinery in the event of automatic equipment failure.
19. The officer in charge of the engineering watch shall bear in mind that changes in speed, resulting from machinery malfunction, or any loss of steering, may imperil the safety of the ship and life at sea. The bridge shall be immediately notified, in the event of fire, and of any impending action in machinery spaces that may cause reduction in the ship's speed, imminent steering failure, stoppage of the ship's propulsion system or any alteration in the generation of electric power or similar threat to safety. This notification, where possible, shall be accomplished before changes are made, in order to afford the bridge the maximum available time to take whatever action is possible to avoid a potential marine casualty.
20. The officer in charge of the engineering watch shall notify the chief engineer officer without delay:
    - 20.1. when engine damage or a malfunction occurs which may be such as to endanger the safe operation of the ship;
    - 20.2. when any malfunction occurs which, it is believed, may cause damage or breakdown of propulsion machinery, auxiliary machinery or monitoring and governing systems; and
    - 20.3. in any emergency or if in any doubt as to what decision or measures to take.

21. Despite the requirement to notify the chief engineer officer in the foregoing circumstances, the officer in charge of the engineering watch shall not hesitate to take immediate action for the safety of the ship, its machinery and crew where circumstances require.
22. The officer in charge of the engineering watch shall give the watchkeeping personnel all appropriate instructions and information which will ensure the keeping of a safe engineering watch. Routine machinery upkeep, performed as incidental tasks as a part of keeping a safe watch, shall be set up as an integral part of the watch routine. Detailed repair maintenance involving repairs to electrical, mechanical, hydraulic, pneumatic or applicable electronic equipment throughout the ship shall be performed with the cognizance of the officer in charge of the engineering watch and chief engineer officer. These repairs shall be recorded.

Engineering watchkeeping under different conditions and in different areas

Restricted visibility

23. The officer in charge of the engineering watch shall ensure that permanent air or steam pressure is available for sound signals and that at all times bridge orders relating to changes in speed or direction of operation are immediately implemented and, in addition, that auxiliary machinery used for maneuvering is readily available.

Coastal and congested waters

24. The officer in charge of the engineering watch shall ensure that all machinery involved with the maneuvering of the ship can immediately be placed in the manual mode of operation when notified that the ship is in congested waters. The officer in charge of the engineering watch shall also ensure that an adequate reserve of power is available for steering and other maneuvering requirements. Emergency steering and other auxiliary equipment shall be ready for immediate operation.

Ship at anchor

25. At an unsheltered anchorage the chief engineer officer shall consult with the master whether or not to maintain the same engineering watch as when underway.
26. When a ship is at anchor in an open roadstead or any other virtually "at sea" condition, the engineer officer in charge of the engineering watch shall ensure that:
    - 26.1. an efficient engineering watch is kept;
    - 26.2. periodic inspection is made of all operating and stand-by machinery;
    - 26.3. periodic inspection is made of all operating and stand-by machinery;
    - 26.4. measures are taken to protect the environment from pollution by the ship, and that applicable pollution prevention regulations are complied with; and
    - 26.5. all damage control and fire-fighting systems are in readiness.

PART 4 - WATCHKEEPING IN PORT

Principles applying to all watchkeeping

General

90. On any ship safely moored or safely at anchor under normal circumstances in port, the master shall arrange for an appropriate and effective watch to be maintained for the purpose of safety. Special requirements may be necessary for special types of ships' propulsion systems or ancillary equipment and for ships carrying hazardous, dangerous, toxic or highly flammable materials or other special types of cargo.

Watch arrangements

95. The chief engineer officer, in consultation with the master, shall ensure that engineering watchkeeping arrangements are adequate to maintain a safe engineering watch while in port. When deciding the composition of the engineering watch, which may include

appropriate engine-room ratings, the following points are among those to be taken into account:

1. on all ships of 3,000 kW propulsion power and over there shall always be an officer in charge of the engineering watch;
2. on ships of less than 3,000 kW propulsion power there may be, at the master's discretion and in consultation with the chief engineer officer, no officer in charge of the engineering watch; and
3. officers, while in charge of an engineering watch, shall not be assigned or undertake any task or duty which would interfere with their supervisory duty in respect of the ship's machinery system.

Taking over the watch

2. Officers in charge of the deck or engineering watch shall not hand over the watch to their relieving officer if they have any reason to believe that the latter is obviously not capable of carrying out watchkeeping duties effectively, in which case the master or chief engineer shall be notified accordingly. Relieving officers of the deck or engineering watch shall ensure that all members of their watch are apparently fully capable of performing their duties effectively.
3. If, at the moment of handing over the deck or engineering watch, an important operation is being performed it shall be concluded by the officer being relieved, except when ordered otherwise by the master or chief engineer officer.

PART 4-2 - TAKING OVER THE ENGINEERING WATCH

100. Prior to taking over the engineering watch, the relieving officer shall be informed by the officer in charge of the engineering watch as to:
    1. the standing orders of the day, any special orders relating to the ship operations, maintenance functions, repairs to the ship's machinery or control equipment;
    2. the nature of all work being performed on machinery and systems on board ship, personnel involved and potential hazards;
    3. the level and condition, where applicable, of water or residue in bilges, ballast tanks, slop tanks, sewage tanks, reserve tanks and special requirements for the use or disposal of the contents thereof;
    4. any special requirements relating to sanitary system disposals;
    5. the condition and state of readiness of portable fire-extinguishing equipment and fixed fire-extinguishing installations and fire detection systems;
    6. authorized repair personnel on board engaged in engineering activities, their work locations and repair functions and other authorized persons on board and the required crew;
    7. any port regulations pertaining to ship effluents, fire-fighting requirements and ship readiness, particularly during potential bad weather conditions;
    8. the lines of communication available between the ship and shore personnel, including port authorities, in the event of an emergency arising or assistance being required;
    9. any other circumstance of importance to the safety of the ship, its crew, cargo or the protection of the environment from pollution; and
    10. the procedures for notifying the appropriate authority of environmental pollution resulting from engineering activities.
2. Relieving officers, before assuming charge of the engineering watch, shall satisfy themselves that they are fully informed by the officer being relieved, as outlined above, and:
    2.1. be familiar with existing and potential sources of power, heat and lighting and their distribution;

2.2. know the availability and condition of ship's fuel, lubricants and all water supplies; and

2.3. be ready to prepare the ship and its machinery, as far as is possible, for stand-by or emergency conditions as required.

PART 4-4 - PERFORMING THE ENGINEERING WATCH

103. Officers in charge of the engineering watch shall pay particular attention to:

1. the observance of all orders, special operating procedures and regulations concerning hazardous conditions and their prevention in all areas in their charge;

2. the instrumentation and control systems, monitoring of all power supplies, components and systems in operation;

3. the techniques, methods and procedures necessary to prevent violation of the pollution regulations of the local authorities; and

4. the state of the bilges.

2. Officers in charge of the engineering watch shall:

2.1. in emergencies, raise the alarm when in their opinion the situation so demands, and take all possible measures to prevent damage to the ship, persons on board and cargo;

2.2. be aware of the deck officer's needs relating to the equipment required in the loading or unloading of the cargo and the additional requirements of the ballast and other ship stability control systems;

2.3. make frequent rounds of inspection to determine possible equipment malfunction or failure, and take immediate remedial action to ensure the safety of the ship, of cargo operations, of the port and the environment;

2.4. ensure that the necessary precautions are taken, within their area of responsibility, to prevent accidents or damage to the various electrical, electronic, hydraulic, pneumatic and mechanical systems of the ship;

2.5. ensure that all important events affecting the operation, adjustment or repair of the ship's machinery are satisfactorily recorded