

U.S. Department of
Homeland Security

United States
Coast Guard



NAVAL ENGINEER PERSONNEL QUALIFICATION STANDARD

COMDTINST M3502.11C
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COMDTINST M3502.11C

JUN 12, 2013

COMMANDANT INSTRUCTION M3502.11C

Subj: NAVAL ENGINEER PERSONNEL QUALIFICATION STANDARD

1. PURPOSE. The primary goal of the Naval Engineer Personnel Qualification Standard (PQS) program is to train officers for duty as Naval Engineers and is broken down into two parts. Part I, Student Engineer, is completed by finishing Chapters 1-4 during an Officer's initial afloat engineering assignment. Part II, Naval Engineer in Training, is completed by finishing Chapters 5-6 during a subsequent Naval Engineering tour. It is understood that not all officers assigned to initial Student Engineering billets will continue on to be Naval Engineers. The knowledge and skills gained through the completion of Part I will provide an excellent foundation for future assignments in technical, logistical, and operational specialties. Part I of this PQS is generic to all cutter classes and shall be administered in conjunction with a unit's Engineer Officer of the Watch (EOW) qualification process. The unit's Engineer Officer (EO) is responsible to ensure the Student Engineer is well versed in all aspects of the curriculum during the member's first afloat tour. If assigned to a subsequent naval engineering tour upon completion of Part I, the Officer becomes a Naval Engineer in Training. During this tour, the supervisor is responsible for ensuring the Naval Engineer in Training continues the program to completion. Highly motivated Officers who want to become a Naval Engineer are able to commence Part II during their Student Engineering assignment.
2. ACTION. Area, District, and Sector Commanders, Commanding Officers of Headquarters units, Assistant Commandants for Directorates, Judge Advocate General and special staff offices at Headquarters shall ensure that the provisions of this Manual are followed. Internet release is authorized.
3. DIRECTIVES AFFECTED. Student Engineer Personnel Qualification Standard, COMDTINST M3502.11B is cancelled.

DISTRIBUTION - SDL No. 162

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NON-STANDARD DISTRIBUTION:

4. PROCEDURES.

- a. Completion of Chapters 1-4 is the Student Engineer's primary duty during his/her first afloat tour. Chapters 5-6 are typically completed during a subsequent Naval Engineering assignment. All six chapters must be completed in order to be designed as a Naval Engineer and receive the CG-ENG12 Officer Specialty Code (OSC) as part of the Officer Specialty Management System (OSMS). It is strongly recommended that Student Engineers complete the Contracting Officer's Representative (COR) requirements (task in Chapter 5) during their initial afloat tour if they are interested in being assigned as a Port Engineer (PE) in a subsequent tour. It is not a prerequisite for a PE assignment but will greatly ease the transition for becoming a PE.
- b. Chapters 1-6 shall be completed prior to assignment as EO afloat. Warrant Officers or Warrant to Lieutenants assigned to EO billets are exempt from this requirement but should be well versed in the content of this PQS, specifically Chapters 5 and 6.

(1) PART I: The Student Engineer shall:

- (a) Actively pursue and complete the course of study outlined herein, and continuously seek feedback from the EO regarding progress.
- (b) Establish and maintain a Naval Engineer PQS notebook that documents the completion of Chapters 1-6.
- (c) Successfully pass the Chapter 1 written test on basic shipboard engineering knowledge within one year of reporting aboard. The test is located on the CG Learning Management System (LMS) website: <https://elearning.uscg.mil>. To access the test, search the course catalog for "Student Engineer" and then enroll in the course.
- (d) As directed by the EO, work as a member of the main propulsion, auxiliary, electrical, and damage control divisions. Emphasis shall be placed on physically getting involved in repair and preventative maintenance alongside the enlisted engineers. Hands-on learning is the best way to increase your knowledge and appreciate what the members of the department are doing.
- (e) As directed by the EO, participate in engineering plant light-off and securing schedules and all special evolutions until qualified as an EOW.
- (f) Qualify as an EOW. Until qualified, the Student Engineer shall stand underway and inport watches with a qualified EOW as directed by the EO and the unit's break-in watch rotation standards. Watchstanding and learning by hands on experience is the backbone of the Naval Engineer program. As general guidance, a Student Engineer should stand break-in watches at least 2 days per week inport and optimize the time available to stand watches while underway.
- (g) Ensure completion is documented in the Student Engineer's official record as required at the end of each Chapter. It is recommended that the Student Engineer

documents completion of Chapters on Record of Professional Development, Form CG-4082.

(2) PART I: The EO shall:

- (a) Brief the engineering department on their role in the Naval Engineer PQS program. Solicit input from Chiefs and Senior Petty Officers regarding the Student Engineer's technical aptitude and interpersonal skills demonstrated while working closely with enlisted personnel.
- (b) Actively supervise, instruct, and provide frequent feedback to the Student Engineer.
- (c) Conduct counseling sessions at least once per month to review the Student Engineer's Naval Engineer PQS notebook and evaluate his/her progress.
- (d) Document completion of each Chapter and the Student Engineer's overall capabilities, interest, and engineering aptitude in the officer's OER. A specific comment regarding suitability for assignment as Engineer Officer afloat shall be included in the OER. Also, all appropriate competencies shall be entered into the Direct Access system as noted in each Chapter.
- (e) Keep the command informed of the Student Engineer's status throughout the program.
- (f) Mentor the Student Engineer and educate him/her on the career opportunities in Naval Engineering. The Naval Engineering Career portal website has great resources to assist in these efforts (<https://cgportal2.uscg.mil/communities/naval-engineering-career-info>).

(3) PART II: The Naval Engineer in Training shall:

- (a) Be assigned to a Naval Engineering support billet or Assistant Engineer Officer (AEO) billet. This can be following a CO/XO/OPS/WEPS afloat assignment or Naval Engineering Graduate School assignment.
- (b) Pursue completion of Chapters 5 and 6 during subsequent duty assignments and seek designation from Commandant (CG-4) as a Coast Guard Naval Engineer upon program completion as per Appendix A.
- (c) Apply for CG-ENG12 OSC upon completion of both Parts of this PQS by routing a memo from the Naval Engineer in Training's command to Commandant (CG-4) as per Appendix A. This will enable the Naval Engineer in Training to become officially designated as a Naval Engineer.

(4) PART II: The subsequent Naval Engineering tour supervisor shall:

- (a) Actively supervise, instruct, and provide frequent feedback to the Naval Engineer in Training.
- (b) Provide the Naval Engineer in Training opportunities to gain experience required by this Manual.
- (c) Document completion of Chapters 5 and 6 in the Officer's OER and include comments on the Officer's capabilities, interest, and engineering aptitude upon completion of the Naval Engineer PQS program. The Naval Engineer in Training should also document completion of Chapters 5 and 6 on Record of Professional Development, Form CG-4082. Also, all appropriate competencies shall be entered into the Direct Access system as noted in each Chapter.
- (d) Submit program completion memo to Commandant (CG-4) thru Commandant (CG-45) for the Naval Engineer in Training as indicated in the sample memo in Appendix A of this manual. This will be the avenue by which the Officer will be designated as a Naval Engineer (CG-ENG12).
- (e) Keep the command informed of the Naval Engineer in Training's status throughout the program.
- (f) Mentor the Naval Engineer in Training and educate him/her on the career opportunities in naval engineering. The Naval Engineering Career portal website has great resources to assist in these efforts (<https://cgportal2.uscg.mil/communities/naval-engineering-career-info>).

5. MAJOR CHANGES.

- a. Changed title from Student Engineer PQS to Naval Engineer PQS to better align with the goals of the PQS program, which is to become designated as a Naval Engineer.
- b. Divided PQS into two parts to better understand responsibilities at each stage of the PQS.
- c. Chapter 1:
 - (1) Moved Shipboard Organization from Chapter 3 to Chapter 1, Section 1101.
 - (2) Added Section 1210 – Cathodic Protection.
 - (3) Added Section 1211 – US Coast Guard Environmental Policy.
 - (4) Added Twin Pivot Arm Davit to Section 1227 – Miscellaneous Auxiliary Equipment.
 - (5) Removed Motor Surf Boat and Aircraft Ship Integrated Secure and Transverse (ASIST) System from Section 1227 – Miscellaneous Auxiliary Equipment.
 - (6) Changed Basic Damage Control PQS completion requirements to 3 months vice 6 months after reporting aboard.

- (7) Removed the requirement to qualify as Small Boat Engineer. Added required tasks from the Boat Manual, COMDTINST M16114.33 (series) to familiarize the Student Engineer with the duties and responsibilities of a Small Boat Engineer.
 - (8) Removed the requirement to qualify as a Fuel Oil Water King (FOWK). Added familiarity tasks to ensure full understanding of the roles and responsibilities of a FOWK.
- d. Chapter 3:
- (1) Moved Engineering Department Maintenance Management from Chapter 5 to Chapter 3, Section 3101.
 - (2) Updated sections to reflect modernized business practices.
 - (3) Added optional task to apply for Merchant Mariner License.
- e. Chapter 5:
- (1) Added requirement for drawing block diagram of Naval Engineering Support Structure from cutter to Commandant (CG-45).
 - (2) Aligned sections with Surface Forces Logistics Center Product Line maintenance organization and modernization.
 - (3) Added task to complete Contracting Officer's Representative (COR) prerequisites and apply for COR designation.
- f. Chapter 6:
- (1) Changed chapter's focus to be on Program Management.
 - (2) Added task to complete DHS Program Manager, Life Cycle Logistics, OR Systems Engineering Level I prerequisites and apply for DHS certification.
6. REQUEST FOR CHANGES. Recommendations for improvements to this manual should be submitted via the chain of command to the Commandant (CG-452), Office of Naval Engineering Policy Manager. The appropriate point of contact's information can be found on the Commandant (CG-45) Portal Website: <https://cgportal2.uscg.mil/units/cg45>.
7. RECORDS MANAGEMENT CONSIDERATIONS. This Manual has been thoroughly reviewed during the directives clearance process, and it has been determined there are no further records scheduling requirements, in accordance with Federal Records Act, 44 U.S.C. 3101 et seq., NARA requirements, and Information and Life Cycle Management Manual, COMDTINST M5212.12 (series). This policy does not have any significant or substantial change to existing records management requirements.

8. ENVIRONMENTAL ASPECT AND IMPACT CONSIDERATIONS.

- a. The development of this directive and the general policies contained within it have been thoroughly reviewed by the originating office and are categorically excluded under current USCG categorical exclusion (CE) # 21 from further environmental analysis, in accordance with Section 2.B.2. and Figure 2-1 of the National Environmental Policy Act Implementing Procedures and Policy for Considering Environmental Impacts, COMDTINST M16475.1 (series).
- b. This directive will not have any of the following: significant cumulative impacts on the human environment; substantial controversy or substantial change to existing environmental conditions; or inconsistencies with any Federal, State, or local laws or administrative determinations relating to the environment. All future specific actions resulting from the general policies in this Manual must be individually evaluated for compliance with the National Environmental Policy Act (NEPA), Council on Environmental Policy NEPA regulations at 40 CFR Parts 1500-1508, DHS and Coast Guard NEPA policy, and compliance with all other environmental mandates.

9. FORMS/REPORTS. The forms referenced in this Manual are available in USCG Electronic Forms on the Standard Workstation or on the Internet: <http://www.uscg.mil/forms/>; CG Portal <https://cgportal2.uscg.mil/library/forms> and Intranet at <http://cgweb.comdt.uscg.mil/CGForms>.

R. J. RÁBAGO /s/
Rear Admiral, U.S. Coast Guard
Assistant Commandant for Engineering and Logistics

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TABLE OF CONTENTS

PART I: STUDENT ENGINEER

CHAPTER 1 - BASIC SHIPBOARD ENGINEERING	1-1
SECTION 1101 – SHIPBOARD ORGANIZATION	1-1
SECTION 1102 – MECHANICAL FUNDAMENTALS	1-3
SECTION 1103 – ELECTRICAL FUNDAMENTALS	1-5
SECTION 1104 – SAFETY FUNDAMENTALS	1-7
SECTION 1105 – HYDRAULIC FUNDAMENTALS.....	1-10
SECTION 1106 – ELECTRIC DRIVE PROPULSION FUNDAMENTALS	1-11
SECTION 1107 – WELDING AND CUTTING FUNDAMENTALS	1-12
SECTION 1108 – CASUALTY CONTROL FUNDAMENTALS	1-14
SECTION 1201 – DIESEL ENGINE SYSTEM (MAIN DIESEL ENGINE (MDE), SHIPS SERVICE DIESEL GENERATOR (SSDG), EMERGENCY DIESEL GENERATOR (EDG))	1-15
SECTION 1202 – GAS TURBINE SYSTEM.....	1-17
SECTION 1203 – PROPULSION SHAFTING, BEARINGS, PROPELLERS, AND REDUCTION GEARS SYSTEMS	1-18
SECTION 1204 – CONTROLLABLE PITCH PROPELLER SYSTEM	1-19
SECTION 1205 – STEERING SYSTEM.....	1-20
SECTION 1206 – DIESEL ENGINE JACKET WATER SYSTEM (MDE, SSDG).....	1-21
SECTION 1207 – SEAWATER SYSTEM.....	1-22
SECTION 1208 – FUEL OIL AND LUBE OIL SYSTEMS	1-23
SECTION 1209 – COMPRESSED AIR SYSTEM (LOW PRESSURE, HIGH PRESSURE, AND STARTING AIR)	1-25
SECTION 1210 – CATHODIC PROTECTION	1-26
SECTION 1211 – US COAST GUARD ENVIRONMENTAL POLICY.....	1-27
SECTION 1212 – BALLAST, DEBALLAST, AND STRIPPING SYSTEM.....	1-28
SECTION 1213 – BILGE DRAINAGE SYSTEMS	1-29
SECTION 1214 – SEWAGE COLLECTION, HOLDING, AND TRANSFER (CHT) SYSTEM	1-30
SECTION 1215 – POTABLE WATER SYSTEM	1-31
SECTION 1216 – WATER PURIFICATION SYSTEM.....	1-32
SECTION 1217 – SHIP SERVICE BOILER SYSTEM.....	1-33
SECTION 1218 – REFRIGERATION SYSTEM	1-34
SECTION 1219 – AIR CONDITIONING AND CHILLER SYSTEM	1-35
SECTION 1220 – HEATING AND VENTILATION SYSTEM.....	1-36
SECTION 1221 – ELECTRICAL DISTRIBUTION SYSTEM	1-37
SECTION 1222 – INTERIOR COMMUNICATIONS SYSTEM	1-38
SECTION 1223 – GYROCOMPASS SYSTEM	1-39
SECTION 1224 – FIREMAIN SYSTEM.....	1-40
SECTION 1225 – AQUEOUS FILM FORMING FOAM (AFFF) SYSTEM	1-41
SECTION 1226 – AVIATION JP-5 FUEL SYSTEM.....	1-42
SECTION 1227 – MISCELLANEOUS AUXILIARY EQUIPMENT.....	1-43
SECTION 1301 – REQUIRED TASKS	1-48
COMPLETION RECORD OF CHAPTER 1	1-50
CHAPTER 2 – DAMAGE CONTROL ASSISTANT/SENIOR ENLISTED SCHOOL	2-1
SECTION 2101 - DAMAGE CONTROL ASSISTANT / SENIOR ENLISTED (DCASE) SCHOOL	2-1

CHAPTER 3 - ENGINEERING MANAGEMENT AND ADMINISTRATION AFLOAT3-1

SECTION 3101 – ENGINEERING DEPARTMENT MAINTENANCE MANAGEMENT.....3-1

SECTION 3102 – ENGINEERING DEPARTMENT RECORDS AND PROGRAMS3-3

SECTION 3103 – STABILITY AND BUOYANCY FUNDAMENTALS3-5

SECTION 3104 – TRAINING FUNDAMENTALS3-7

SECTION 3105 – CORRESPONDENCE FUNDAMENTALS.....3-9

SECTION 3106 – PERSONNEL MANAGEMENT FUNDAMENTALS3-10

SECTION 3107 – LOGISTICS AND FINANCIAL MANAGEMENT FUNDAMENTALS.....3-13

SECTION 3201 – REQUIRED TASKS3-15

COMPLETION RECORD OF CHAPTER 33-18

CHAPTER 4 – DECK WATCH OFFICER.....4-1

SECTION 4101 - DECK WATCH OFFICER (DWO) TRAINING4-1

PART II: NAVAL ENGINEER IN TRAINING

CHAPTER 5 - NAVAL ENGINEERING ORGANIZATION & MAINTENANCE MANAGEMENT5-1

SECTION 5101 – NAVAL ENGINEERING SUPPORT ORGANIZATIONAL STRUCTURE.....5-1

SECTION 5102 – ASSET MAINTENANCE MANAGEMENT5-3

SECTION 5103 – PROGRAM DEPOT MAINTENANCE MANAGEMENT5-5

SECTION 5201 – REQUIRED TASKS5-8

COMPLETION RECORD OF CHAPTER 55-10

CHAPTER 6 - PROGRAM MANAGEMENT AND MISSION SUPPORT FUNDAMENTALS6-1

SECTION 6101 – PROGRAM MANAGEMENT FUNDAMENTALS6-1

SECTION 6201 – REQUIRED TASKS6-3

COMPLETION RECORD OF CHAPTER 66-4

APPENDIX A - SAMPLE COMPLETION MEMO OF BOTH PARTS OF PQSA-1

APPENDIX B - SAMPLE DESIGNATION MEMO FROM COMMANDANT (CG-4)B-1

PART I

STUDENT ENGINEER

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CHAPTER 1 - BASIC SHIPBOARD ENGINEERING

Basic Shipboard Engineering. This Chapter should normally be completed within 1 year of reporting aboard. Assignment as Student Engineer is an Officer's primary duty. Due to the demanding nature of this program, non-engineering collateral duty assignments shall be minimized until completion of Chapter 1. The Student Engineer shall successfully pass the Chapter 1 written basic shipboard engineering knowledge test within 1 year of reporting aboard. The test is located on the CG Learning Management System (LMS) website: <https://elearning.uscg.mil>. To access the test, search the course catalog for "Student Engineer" and then enroll in the course. Specific performance qualification references were developed by TRACEN Yorktown and are available on the Naval Engineering Career Portal website (<https://cgportal2.uscg.mil/communities/naval-engineering-career-info>) under Student Engineering Program. These documents will help facilitate completion of Chapter 1 knowledge requirements and written test. The written test can also be accessed from the Naval Engineering Career Portal website. Upon completion of Chapter 1, the EO shall evaluate the Student Engineer's technical aptitude for further training. If an officer does not wish to remain in the program, or if the EO recommends that the officer should not be permitted to continue in the program, the Commanding Officer may initiate a letter to Commander, Coast Guard Personnel Center (CGPC-OPM) so indicating. Commander, Coast Guard Personnel Center (CGPC-OPM) may reassign the officer, as the needs of the service require.

SECTION 1101 – SHIPBOARD ORGANIZATION

A. Reference Material:

1. Naval Engineering Manual, COMDTINST M9000.6 (series)
2. Cutter Organization Manual, COMDTINST M5400.16 (series)
3. Naval Ships Technical Manual, Chapter 074 (V3) & 555 (V1)
4. Engineering Department Organization & Regulations Manual
5. Manufacturers' Technical Publications, Ship's Information Books, Casualty Control Manual, Ship's Drawings.

B. Discuss the content of the following documents:

1. Cutter Organization Manual, COMDTINST M5400.16 (series)
2. Standard Operating Procedures (SOP)
3. Casualty Control Manual
4. Machinery Space Firefighting Doctrine
5. PMS Manuals for Main Propulsion, Auxiliary, Electrical, and Damage Control
6. Damage Control Books and Drawings
7. Ship's Information Books
8. EO Standing Orders
9. Equipment Operating Procedures (EOP)
10. Training and Education Manual, COMDTINST M1500.10 (series)
11. Cutter Training and Qualification Manual, COMDTINST M3502.4 (series)
12. Supply Policies and Procedures Manual (SPPM), COMDTINST M4400.19 (series)
13. Safety and Environmental Health Manual, COMDTINST M5100.47 (series)
14. Directives, Publications, and Reports Index, COMDTNOTE 5600 (series)
15. Equipment Tag-out Procedure, COMDTINST 9077.1 (series)

C. State the duties of the following as defined in the Cutter Organization Manual, COMDTINST M5400.16 (series):

1. Commanding Officer (CO)
2. Executive Officer (XO)
3. Engineer Officer (EO)
4. Damage Control Officer (DCO)
5. Main Propulsion Assistant (MPA)
6. Damage Control Assistant (DCA)
7. Assistant Engineer Officer (AEO)
8. Auxiliary Officer

COMDTINST M3502.11C

9. Electrical Officer
 10. Safety Officer
 11. Training Officer
 12. Officer of the Deck (OOD)
 13. Engineer Officer of the Watch (EOW)
 14. Gas Free Engineer (GFE)
 15. Damage Control Petty Officer (DCPO)
- D. For all watchstations listed below, explain the duties and responsibilities as defined in the EO Standing Orders:
1. EOW
 2. Throttleman
 3. Oiler / Machinery Watch
 4. Auxiliary Watch
 5. Security Watch
 6. Small Boat Engineer
 7. Fire Marshal
 8. Fuel Oil and Water King (FOWK)
 9. Duty Damage Controlman
 10. Duty Electrician
 11. DCPO

SECTION 1102 – MECHANICAL FUNDAMENTALS

- A. Reference Material.
1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 2. Principles of Naval Engineering, NAVEDTRA 10788
 3. Applicable Naval Ships Technical Manual Chapters; refer to Chapter 001, Publications Index
 4. Manufacturers' Technical Publications
 5. Coatings and Color Manual, COMDTINST M10360.3 (series)
 6. Student Engineer Performance Qualification Guides
- B. Describe the operation of the following:
- | | |
|---------------------------------------|--|
| 1. Globe valve | 16. Backflow preventing valve |
| 2. Gate valve | 17. Pressure gauges |
| 3. Check (Lift, Ball, Swing) valve | 18. Tank level indicators |
| 4. Ball valve | 19. Vacuum gauges |
| 5. Plug | 20. Fluid flow meters |
| 6. Directional control valve | 21. Compound gauges |
| 7. Needle valve | 22. Revolution counters (shaft counter, RPM gauge) |
| 8. Pressure reducing/regulating valve | 23. Thermometers |
| 9. Butterfly valve | 24. Pyrometers |
| 10. Thermostatically controlled valve | 25. Manometer |
| 11. Orifice valve | 26. Governor function |
| 12. Relief valve | 27. Ultrasonic thickness (UT) tester |
| 13. Pilot Controlled valve | 28. Dry film thickness (DFT) tester |
| 14. Safety Valve | 29. Differential gauge |
| 15. Fuel cut-out (isolation) valves | |
- C. Identify the respective blue print symbology for each valve listed in 1101.B.
- D. State the function of the following safety devices:
1. Overspeed trip
 2. Emergency hand trip
 3. Low oil pressure trip
 4. Interlocks
 5. Thermal Overload Relay
 6. Automatic shutdown device
 7. Float switch
 8. Flow switch
 9. Temperature switch
- E. State how the following pumps move fluids; are they positive or non-positive displacement type?
1. Reciprocating
 2. Rotary
 3. Centrifugal
 4. Gear
 5. Vane
 6. Axial Piston
 7. Jet
 8. Propeller
 9. Screw
 10. Air-Operated Diaphragm
- F. Define the following as applied to pumps:
1. Capacity
 2. Aeration
 3. Packing

COMDTINST M3502.11C

4. Cavitation
 5. Mechanical Seal
 6. Suction/Discharge Head
 7. Power End / Fluid End
 8. Lantern Ring
 9. Pressure Compensated
- G. Define the following engineering terms:
- | | |
|-----------------------------|------------------------|
| 1. Light offs | 15. Potential energy |
| 2. Cross-connect | 16. Secure |
| 3. Standby | 17. Dew point |
| 4. Cut in | 18. Circulation/recirc |
| 5. Press Up | 19. Line up |
| 6. Cut out | 20. Warm up |
| 7. Absolute Pressure (psia) | 21. Auxiliary |
| 8. Settle out | 22. Blowdown |
| 9. Gauge pressure (psig) | 23. Brake Horse Power |
| 10. Viscosity | 24. Torque |
| 11. Bypass | 25. Priming |
| 12. On the line (OTL) | 26. Shaft Horse Power |
| 13. Cold iron | 27. OOC |
| 14. Kinetic energy | 28. Overtorque |
- H. Identify the basic application and types of heat exchangers.
- I. Describe the function of gears in terms of changing speed, direction, and torque of shafts.
- J. State the purpose of the shaft turning gear.
- K. How do the following factors contribute to or reduce the efficient and economical operation of the engineering plant?
1. Clean heat exchanger surfaces
 2. Overloaded and underloaded engine
 3. Excessive exhaust temperature
 4. Load balance (plant) and liquid load
 5. Ventilation
- L. List the color codes and describe the purpose of colors used to identify the following systems:
1. Seawater
 2. JP-5
 3. Firemain
 4. Lube Oil
 5. Potable water
 6. Low Pressure Air
 7. Fuel Oil
 8. Steam
 9. Sewage
 10. Waste oil
 11. Hydraulic
 12. AFFF
 13. Countermeasure Washdown
- M. Become familiar with the piping system designation and marking criteria outlined in NSTM 505.

SECTION 1103 – ELECTRICAL FUNDAMENTALS

- A. Reference Material.
1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 2. Naval Ships Technical Manual, Chapters 300, 310, 313, 320
 3. Electrician's Mate, NAVEDTRA 14344
 4. Blueprint Reading and Sketching, NAVEDTRA 14040
 5. Manufacturer's Technical Publications
 6. Student Engineer Performance Qualification Guides
- B. Identify the function and application of each of the following:
- | | |
|-------------------------------------|---|
| 1. Voltage tester | 31. Voltage |
| 2. Ammeter (clamp on./inline) | 32. Current |
| 3. Voltmeter (manual/auto) | 33. Ampere |
| 4. Tachometer | 34. Power Factor (p.f.) Generator Operation |
| 5. Frequency meter | 35. Watt |
| 6. Transformer | 36. Resistance/Ohm |
| 7. Voltage regulator | 37. Generator |
| 8. Reverse power relay | 38. Armature/Stator |
| 9. Controllers (LVR/LVP/LVRE) | 39. Slip Rings |
| 10. Fuses | 40. Commutator |
| 11. Distribution panels | 41. Brushes |
| 12. Circuit breakers | 42. Brushless |
| 13. Switchboard | 43. Hertz |
| 14. Synchronizing monitor | 44. Direct Current (DC) |
| 15. Thermocouple | 45. Short Circuit |
| 16. Bus transfer switches (ABT/MBT) | 46. Prime Mover |
| 17. Voltage-adjusting | 47. Field Excitation |
| 18. Rheostat | 48. Parallel/Split-Plant |
| 19. Kilowatt meter | 49. Isochronous |
| 20. Meter selector switches | 50. Droop |
| 21. Power available lights | 51. Selective Tripping |
| 22. Breaker position lights | 52. Field/Rotor |
| 23. Power factor capacitor | 53. Alternating Current (AC) |
| 24. Droop switch | 54. Motor |
| 25. Ground detector indicator | 55. Thyristor |
| 26. Phase-sequence meter | 56. Programmable Logic Controller (PLC) |
| 27. Megohmmeter (Megger) | 57. Type I Power |
| 28. Multi-meter | 58. 400 Hz Power Supply |
| 29. Conductor | 59. Variable Frequency Drives |
| 30. Signal Generator | |
- C. Define the difference in principle of operation between a generator and motor.
- D. State the basic unit of measure and list the symbols used for identifying the following:
1. Voltage
 2. Current
 3. Resistance
 4. Frequency
 5. Power
- E. State the basic principle of electrical power generation.
- F. State the relationship between current, voltage, and resistance.
- G. Explain the importance of an ungrounded system on board a ship.

COMDTINST M3502.11C

- H. Explain the difference between medium and high voltage installations.
- I. Explain the procedures for hooking up shore power.
- J. Explain the procedures for hooking up and removing casualty power.
- K. Explain how to detect, isolate, and clear an electrical ground.
- L. Demonstrate the proper operation of the following two electrical meters:
 - 1. Multi-meter
 - 2. Mega-ohm meter

SECTION 1104 – SAFETY FUNDAMENTALS

- A. Reference Material.
 - 1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 - 2. Asbestos Exposure Control Manual, COMDTINST 6260.16 (series)
 - 3. Safety and Environmental Health Manual, COMDTINST 5100.47 (series)
 - 4. Hazard Communication for Workplace Materials, COMDTINST M6260.21 (series)
 - 5. Technical Guide: Practices for Respiratory Protection, COMDTINST M6260.2 (series)
 - 6. Coast Guard Cutter Heat Stress Program, COMDTINST M6260.17 (series)
 - 7. Water Supply and Wastewater Disposal Manual, COMDTINST M6240.5 (series)
 - 8. Equipment Tag-Out Procedure, COMDTINST 9077.1 (series)
 - 9. Eyewash Stations, 29 CFR 1910.151, ANSI Z358.1
 - 10. Student Engineer Performance Qualification Guides

- B. State the purpose of the Safety and Environmental Health Manual, COMDTINST M5100.47 (series).

- C. What are the requirements for posting safety precautions and operating instructions onboard cutters in accordance with Naval Engineering Manual, COMDTINST M9000.6 (series)?

- D. State the requirements/restrictions of the following in engineering spaces:
 - 1. Long-sleeved shirts
 - 2. Hats
 - 3. Goggles/face mask
 - 4. Gloves
 - 5. Safety Boots
 - 6. Respirators
 - 7. Hearing protection (in-ear/around-ear)
 - 8. Electrical Safety Matting
 - 9. Jewelry
 - 10. Polyester Clothing
 - 11. Undershirt
 - 12. Baggy Clothing

- E. State the requirements for single and double hearing protection and safety placard location.

- F. State the importance of eye safety (i.e. hazards associated with wearing contact lenses).

- G. State the use and protective function of the following:
 - 1. Lagging
 - 2. Piping flange shields
 - 3. Machinery guards/shields
 - 4. Red Gear Cover Locks
 - 5. Ground Indicators
 - 6. Breakers/Fuses
 - 7. Fuel oil/lube oil handling program
 - 8. Remote Operated Valve (Emergency Cut Out)
 - 9. Grounding Wand
 - 10. Electrical Matting
 - 11. Pull Away Cane (Dead Man Stick)
 - 12. Caution Lines
 - 13. Reach Rods
 - 14. Quick-closing Valves
 - 15. Automatic Cutouts
 - 16. Coupling Cover
 - 17. Diaphragm Control Valve
 - 18. Strainer Shields

COMDTINST M3502.11C

- H. State the effect and/or hazard caused by the following equipment:
1. Improper valve alignment
 2. Packing gland too tight
 3. Bowed shafting
 4. Improper thread packing procedure
 5. Lack of Lube oil purification
 6. Lube Oil Contamination
 7. Lube Oil Thickening or Thinning
 8. Improper Fasteners
 9. Improper use of tools
 10. Misaligned machinery
- I. Identify the general safety precautions to be observed when operating high speed, rotating machinery.
- J. Explain the importance of staying clear of the shaft turning gear when starting the main engines.
- K. Identify the importance of secured deckplates, gratings, handrails, and safety chains.
- L. State the reasons for good housekeeping practices in engineering spaces.
- M. State the special hazards involved and the procedures to follow when working on a system with single-valve protection.
- N. What are the minimum requirements of a cutter Electrical Safety Program?
- O. Explain the proper procedures to be followed prior to working on electrical machinery/equipment and energized circuits.
- P. Explain the requirements for conducting portable electric tool handling and safety inspections.
- Q. Identify the safety precautions for portable electrical equipment.
- R. Explain the intended use and placement of battle lanterns and emergency lighting.
- S. Explain the procedure for using fuse pullers to replacing fuses.
- T. State the safety precautions to operate an electrical submersible pump.
- U. Explain the safety requirements and procedures for using portable electric lighting (type, construction, and usage).
- V. Explain the procedures for removing a victim from an energized circuit.
- W. State the purpose and importance of enforcing a unit Tag-out program in accordance with Equipment Tag-Out Procedure, COMDTINST 9077.1 (series).
- X. Identify the hazards of fuel oil, lube oil or flammable liquids in bilges.
- Y. Identify the safety precautions to be employed when handling and storing HAZMAT.
- Z. Identify the safety precautions used when handling and storing acids and alkalis.
- AA. State the purpose and use of the information contained on a Material Safety Data System (MSDS). How is an MSDS obtained?

- BB. Describe the potential hazards that exist to personnel entering an unventilated space where CO₂ and/or Halon have been discharged.
- CC. State the precautions to be followed before entering a sealed void or compartment. Define an Immediately Dangerous to Life and Health (IDLH) atmosphere and how it is determined.
- DD. Identify the hazards to personnel working in a space where steam is being released through steam hoses or steam smothering systems.
- EE. Identify the safety hazards for asbestos, fiberglass insulation materials, refrigerants, mercury, lead-based materials, Polychlorinated Biphenyls (PCBs), and fluorescent lamps.
- FF. State the requirements for the handling and storage of gasoline and gasoline equipment.
- GG. State which shipboard spaces are required to have Eye Wash Stations. Who maintains them?
- HH. State the requirements of the heat stress program. What is a Physiological Heat Exposure Limit (PHEL) Chart?
- II. State the requirements of the Respiratory Protection Program (i.e. color coding of respirators, shelf life, in-line respirators, etc).
- JJ. Explain the purpose and methods of use for the GAR model.
- KK. State the procedures and safety precautions required for personnel working aloft, over the side, or during diving operations.

SECTION 1105 – HYDRAULIC FUNDAMENTALS

A. Reference Material.

1. Naval Engineering Manual, COMDTINST M9000.6 (series)
2. Naval Ships Technical Manual, Chapter 556
3. Manufacturers' Technical Publications
4. Student Engineer Performance Qualification Guides

B. Define the following terms, as applied to hydraulics:

- | | |
|----------------------|-----------------------------|
| 1. Force | 22. Hydraulic Fluid |
| 2. Area | 23. Filter |
| 3. Displacement | 24. Accumulator |
| 4. Volume | a. Piston |
| 5. Pressure | b. Spring |
| 6. Reservoir | c. Bladder |
| 7. Regulator | 25. Sequencing Valve |
| 8. Accumulator | 26. Direction Control Valve |
| 9. Actuator | a. Two Position, Four-Way |
| 10. Linear Actuator | 27. Unloading Valve |
| 11. Rotary Actuator | 28. Relief Valve |
| 12. Sequential Speed | a. Simple |
| 13. Reciprocating | b. Compound |
| 14. Orifice | 29. Check Valve |
| 15. Solenoid | a. In-Line |
| 16. Viscosity | b. Pilot-Pressure |
| 17. Test Ports | c. By-Pass |
| 18. Pressure Switch | 30. Flow Control |
| 19. Pressure Gauge | a. Fixed |
| 20. Hydraulic Pump | b. Variable |
| a. Vane | c. Direction Control Valve |
| b. Gear | 31. Counterbalance Valve |
| c. Piston | |
| d. Screw | |
| 21. Strainer | |
| a. Simplex | |
| b. Duplex | |

C. Explain the basic principles of operation and use of the following hydraulic systems:

1. Loop – Open/Closed
2. Re-Generative

D. Describe the procedure for Cleaning and Flushing Hydraulic Systems in accordance with prescribed standards.

E. State the relationship between:

1. Flow rate and actuator speed
2. System pressure and load capacity

SECTION 1106 – ELECTRIC DRIVE PROPULSION FUNDAMENTALS

- A. Reference Material.
 - 1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 - 2. Naval Ships Technical Manual, Chapter 235
 - 3. Manufacturers' Technical Publications
 - 4. Student Engineer Performance Qualification Guides
- B. Describe the function of the propulsion generator and motor.
- C. Explain why some electric drive propulsion plants do not require reduction gears.
- D. Describe the theory and operation of DC and AC propulsion plants.
- E. State the advantages of an electric drive propulsion plant.
- F. Discuss the following System Components and Component Parts:
 - 1. Central Power-plant System
 - 2. Cycloconverter
 - 3. Synchro Converter
 - 4. Permanently Magnetized Motor
 - 5. DC Rectifier
 - 6. High Voltage (HV) Transformer
- G. Principles of Operation:
 - 1. State how the above components work together to achieve system operation.
 - 2. How does this system integrate with the other portions of the machinery plant?
 - 3. State the procedure(s) for using this system.
 - 4. Describe the differences between a Central Power-plant System and a split bus electric drive configuration.
 - 5. Safety precautions:
 - a. What general safety precautions apply to these systems?
 - b. What special training is required to perform maintenance on these systems?
- H. Describe what is meant by the term "Regenerative Power".
- I. Discuss the advantages and disadvantages of podded propulsion drives.

SECTION 1107 – WELDING AND CUTTING FUNDAMENTALS

A. Reference Material.

1. Naval Ships Technical Manual, Chapter 074 (V1, V2, V3)
2. Naval Ships Technical Manual, Chapter 550
3. Manufacturers' Technical Publications
4. Student Engineer Performance Qualification Guide

B. Describe the following:

Joints:

1. Butt joint
2. Edge joint
3. Corner joint
4. Tee joint
5. Lap joint

Types:

1. Bead
2. Fillet
3. Groove
4. Plug
5. Slot
6. Seam
7. Tack
8. Clad

Parts:

1. Face
2. Toe
3. Root

C. Define the following terms:

1. Pass
2. Bead
3. Overlay

D. Explain the welding procedure used for the following:

1. Shielded metal arc welding
2. Plasma arc welding
3. Gas metal arc welding
4. Gas tungsten arc welding
5. Submerged arc welding
6. Stud arc welding
7. Brazing

E. Define the following terms:

- | | |
|---------------------|-------------------------|
| 1. Arc | 8. Deposition Sequence |
| 2. Stud | 9. Backstep Sequence |
| 3. Plasma | 10. Wandering Sequence |
| 4. Submerged | 11. Buildup Sequence |
| 5. Striking the arc | 12. Cascade Sequence |
| 6. Tapping | 13. Block Sequence |
| 7. Layer | 14. Heat Affected Zones |

F. State the difference between a “weld symbol” and a “welding symbol”.

G. Describe the parts of a “welding symbol”.

H. Explain the purpose of welding rods.

I. Explain when and why flux is used.

J. Explain purpose and types of shielding gases.

K. Describe brazing and braze welding.

- L. Describe the following types of flames associated with oxyacetylene welding:
1. Neutral
 2. Reducing (Carburizing)
 3. Oxidizing
- M. Define soldering and its limitations.
- N. Define the following Nondestructive Testing (NDT) techniques:
1. X-ray
 2. Magnaflux
 3. Dye penetrant
 4. Hydrotesting
 5. Air testing
 6. Ultra Sonic Testing
- O. Describe the following weld defects:
- | | |
|---------------|---------------------------------|
| 1. Spatter | 6. Brittleness |
| 2. Overlap | 7. Incomplete fusion |
| 3. Undercut | 8. Inadequate joint penetration |
| 4. Void | 9. Inadequate root penetration |
| 5. Inclusions | 10. Cracks |
- P. Discuss the following safety related items:
1. Personal protective equipment (i.e. helmet, shield, eye protection, gloves, leather clothing, respirator)
 2. Condition of hoses and torches
 3. Operation of backfire flame arrestors and check valves
 4. Condition of regulators
 5. Proper sequence for lighting the torch
 6. Dangers of excessive acetylene pressure and define oxy-acetylene working pressures
 7. Presence of flammables in the area
 8. Protecting the deck and adjacent compartments
 9. Importance of Hotwork chit / Gas-Free Certificate
 10. Security of cylinders in rack and importance of keeping the oxygen and acetylene bottles upright
 11. Dangers of working on metals painted with lead, chromate, galvanized, or vinyl based paints
 12. Proper cleaning of cutting tips
 13. Leak testing for regulators
 14. Proper routing of hoses and welding leads
 15. Storage of oxy-acetylene bottles
 16. Explain the grounding precautions for operating arc welding and cutting equipment
- Q. Hotwork
1. Define hotwork.
 2. State the safety precautions when performing hotwork near preservative coatings.
 3. State the safety precautions when performing hotwork near insulation.
 4. State the safety precautions when performing hotwork near cableways.
 5. State the safety precautions when performing hotwork near tanks.
 6. State the safety precautions when performing hotwork near ammunition compartments.
 7. Discuss why inerting, pressing up, and steam blanketing are less desirable than cleaning and gas freeing the compartment.
- R. Fire Watch
1. State the training requirements of a Fire Watch.
 2. What fire extinguishing equipment does the Fire Watch use?
 3. What personnel protection equipment does the Fire Watch use?
 4. Explain the conditions that would require a Fire Watch.
 5. How long should a Fire Watch stay on site after hotwork is completed?

SECTION 1108 – CASUALTY CONTROL FUNDAMENTALS

- A. Reference Material.
 - 1. Cutter Casualty Control Manual (CCM)
 - 2. Naval Engineering Manual, COMDTINST M9000.6 (series)
 - 3. Naval Ships Technical Manual, Chapter 079, VOL 3
 - 4. Damage Control Book and Drawings
 - 5. Manufacturers' Technical Publications, Ship's Information Books, Casualty Control Manual, Ship's Drawings
 - 6. Student Engineer Performance Qualification Guides
- B. Explain how the Casualty Control Manual is broken up into chapters.
- C. Discuss engineering plant casualty control reporting procedures between watchstations, EOW, and the bridge.
- D. Discuss the basic procedural differences in casualty control between multiple screw ships and single screw ships and the effect on the maneuverability of the ship.
- E. Discuss the training/qualifications and uses of the shipboard Engineering Casualty Control Training Team (ETT).
- F. Describe the relationship between Restricted Maneuvering Doctrine and Casualty Control Manual.

SECTION 1201 – DIESEL ENGINE SYSTEM (MAIN DIESEL ENGINE (MDE), SHIPS SERVICE DIESEL GENERATOR (SSDG), EMERGENCY DIESEL GENERATOR (EDG))

- A. Reference Material.
1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 2. Naval Ships Technical Manual, Chapters 233 and 262
 3. Manufacturers' Technical Publications
 4. Student Engineer Performance Qualification Guides
- B. Define the following:
1. Intake/Exhaust
 2. Compression
 3. Combustion
 4. Timing/Injection
 5. Intake Stroke
 6. Compression Stroke
 7. Power Stroke
 8. Exhaust Stroke
 9. Flash point
 10. Hydraulic lock
 11. Scavenging
 12. Cylinder Block
 13. Crankcase/bedplate
 14. Cylinder head and liner
 15. Governor
 16. Pistons and Connection rods
 17. Turbocharger
 18. Camshafts
 19. Ports/valves
 20. Crankshaft
 21. Flywheel
 22. Aftercooler/Intercooler
 23. Manometer
 24. Blower shutdown
 25. Remote fuel shutdown
 26. Pyrometer
 27. Overspeed trip
 28. Explosion covers
 29. Fuel Rack
 30. Fuel Pump Control Shaft & Crossover Linkage
 31. Water Pump
 32. Exhaust Manifold
 33. Rocker Assembly
 34. Fuel Injectors
 35. Governor Control Linkage
 36. Fuel Injector Pump Support and Drive
 37. Pneumatic, Electric, and Mechanical Control system
 38. Thermostatic Control Valve
 39. Monitoring Console/Panels
 40. Emergency Shutdown
 41. Local/Remote Control Panels
- C. Explain the two-stroke diesel cycle. Include the sequence of events that occur during one cycle.
- D. Explain the four-stroke diesel cycle. Include the sequence of events that occur during one cycle.

COMDTINST M3502.11C

- E. Describe the types of starting mechanisms used on diesel engines.
- F. Describe the operation and uses of the five types of governors:
 - 1. Speed-Limiting
 - 2. Automatic Shutdown
 - 3. Constant Speed
 - 4. Knockdown / Topping
 - 5. Load Sharing: Governor and controls
- G. Identify the types of diesel cylinder arrangements.
- H. List the causes and effects of engine overspeed.
- I. Referencing the appropriate system line diagram on local cutter, explain the lube oil and fuel oil flow paths through the two stroke and four-stroke engine.
- J. Define “crankweb deflection” and how/when is it measured.
- K. Explain the purpose of pyrometers. When is this device used?
- L. What is the purpose of a center section overhaul/top end overhaul and when does each take place?
- M. System Interface. What is the relationship between lube oil temperature, jacket water temperature, and seawater cooling temperature?
- N. Hazards.
 - 1. List the safety precautions that apply to positive crankcase pressure on diesel engine systems.
 - 2. Discuss precautions required after a crankcase explosion.
 - 3. List the precautions that must be taken when walking around any diesel exhaust piping.

SECTION 1202 – GAS TURBINE SYSTEM

- A. Reference Material.
1. Naval Ships Technical Manual, Chapter 234
 2. Manufacturers' Technical Publications
 3. Student Engineer Performance Qualification Guides
- B. Define the following as applied to the gas turbine engine:
- | | |
|---|--------------------------------------|
| 1. High-pressure turbine | 17. Compressor inlet plenum |
| 2. Free turbine | 18. Compressor |
| 3. Accessory drive assembly | 19. Combustion section |
| 4. Freewheeling | 20. High pressure (HP) turbine |
| 5. Compressor stall | 21. Free power turbine |
| 6. Compressor surge | 22. Ignition system |
| 7. Power measurement | 23. High-speed flexible coupling |
| 8. Single-shaft gas turbine | 24. Gas turbine bearings |
| 9. Power takeoff assembly | 25. Accessory drive assembly |
| 10. Igniters | 26. Compressor variable stator vanes |
| 11. Hydra-start | 27. Engine bleed air manifolds |
| 12. Precipitator | 28. Customer bleed air manifold |
| 13. Air assist | 29. Inlet guide vanes |
| 14. Base enclosure assembly | 30. Altair solenoid valves |
| 15. Fire detection and extinguishing system | 31. Motor-operated fuel valve |
| 16. Water wash system | 32. Anti-icing system |
- C. Principles of Operation.
1. Referencing system line diagram of local cutter, show the path of primary and secondary air through the engine.
 2. What are the sources and uses of bleed air within the gas turbine?
 3. What are the effects of a "hot shutdown"?
 4. How do the variable stator vanes prevent compressor stalls of a gas turbine?
- D. Safety Hazards. State the safety precautions that apply when entering or leaving a gas turbine:
1. Plenum
 2. Enclosure
- E. Explain the difference between an open and closed engine cycle.
- F. Explain the energy conversion process that occurs in the following:
1. Compressor
 2. Combustion chamber
 3. Turbine
- G. Explain the effects of the marine environment on gas turbine engines and the precautions taken to compensate for this environment.
- H. State the possible causes of ice formation on air inlets.
- I. Explain the effect of foreign object damage on compressor blades.

SECTION 1203 – PROPULSION SHAFTING, BEARINGS, PROPELLERS, AND REDUCTION GEARS SYSTEMS

- A. Reference Material.
1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 2. Naval Ships Technical Manual Chapters, 078 (V1 & V2), 241, 243, 244, 245
 3. Manufacturers' Technical Publications
 4. Student Engineer Performance Qualification Guides
- B. Define the following:
- | | |
|--|--|
| 1. Thrust | 16. Fixed Pitch Propeller |
| 2. Reduction ratio | 17. Line Shaft |
| 3. Auxiliary Drive | 18. Thrust Shaft |
| 4. Quill shaft | 19. Stern Tube Shaft |
| 5. Solid Coupling | 20. Tail Shaft |
| 6. Spring Bearing | 21. Line Shaft Bearings |
| 7. Controllable Pitch Propeller (CPP) | 22. Shaft Seal (CPP) |
| 8. Clutch | 23. Mechanical Shaft Seal (John Crane) |
| 9. Come home bolts | 24. Stuffing Tube |
| 10. Pinion | 25. Stern Tube Bearing |
| 11. Intermediate gear | 26. Strut Bearing |
| 12. Bull Gear | 27. Inflatable Shaft Seal |
| 13. Turning Gear | 28. Journal Bearing |
| 14. Pedestal Bearing | 29. Shaft Liners |
| 15. Gear (Spur, Helical, Herring Bone) | 30. Thrust Bearing |
- C. Explain the procedures for opening/inspecting/working on main propulsion reduction gear.
- D. State the importance of taking thrust bearing readings.
- E. Explain the advantages/disadvantages of the various types of gear (e.g. straight, helical).
- F. State the reasons for using Reduction Gear oil sump heaters.
- G. How do the following effect reduction gears?
1. Lubrication
 2. Locking/unlocking of the shaft
 3. Gear tooth inspection (Tooth contact and wear)
 4. Vibration
 5. Spray Pattern
- H. State the advantages and disadvantages of fixed-pitch propellers.
- I. Define "freewheeling" or "trailing" a shaft.
- J. Explain how or when the following are accomplished:
1. Lubrication of line shaft bearings
 2. Lubrication of stern tube and strut bearings
- K. State the differences in operation between a Combined Diesel or Gas Turbine (CODOG) and a Combined Diesel and Gas Turbine (CODAG) system.
- L. Describe the operation of a combined diesel or gas turbine (CODOG) plant.
- M. Describe the operation of a combined diesel and gas turbine (CODAG) plant.

SECTION 1204 – CONTROLLABLE PITCH PROPELLER SYSTEM

- A. Reference Material.
1. Naval Ships Technical Manual, Chapter 245
 2. Naval Engineering Manual, COMDTINST M9000.6 (series)
 3. Manufacturers' Technical Publications, Ship's Information Books, Casualty Control Manual, Ship's Drawings
 4. Student Engineer Performance Qualification Guides
- B. System Components and Component Parts. State the function of the following system components and component parts:
1. Oil Distribution Box
 2. Control Valve Manifold
 3. Electric pumps
 4. Relief valves
 5. Reducing valves
 6. Control Piston
 7. Pilot Piston
 8. Emergency pitch positioner
 9. Rod Control
 10. Electric Actuator/Pneumatic Actuator
 11. Blade seals
 12. Crosshead
 13. Hub piston/Servomotor piston
 14. Regulating valve
 15. Sump Tank
 16. Head Tank
 17. Gear driven hydraulic oil pump
- C. Principles of Operation.
1. Referencing the system line diagram on local cutter, show the path of hydraulic oil from the sump tank through the system and back to the sump.
 2. What is the sequence of component involvement for:
 - a. Supplying control oil to the oil distribution box to vary the position of the valve rod.
 - b. Supplying high pressure (HP) hydraulic oil to the propeller hub to effect a change in pitch.
 - c. Prevent water from entering the hub & oil leaking out.
 3. Explain how to verify and adjust pitch.

SECTION 1205 – STEERING SYSTEM

- A. Reference Material.
 - 1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 - 2. Naval Ships Technical Manual, Chapter 562
 - 3. Manufacturers' Technical Publications, Ship's Information Books, Casualty Control Manual, Ship's Drawings
 - 4. Student Engineer Performance Qualification Guides

- B. Define the following System Components and Component Parts:
 - 1. Transmission Equipment
 - a. Steering control cable selector switches
 - b. Steering control cables (PORT and STBD)
 - c. Trick wheel
 - d. Auto pilot systems
 - 2. Manual Control Unit
 - 3. Power Unit
 - a. Steering motors
 - b. Steering pumps
 - c. Emergency hand pump
 - d. Block & Tackle
 - 4. Ram Unit
 - a. Ram
 - b. Cylinder
 - c. Rudder Linkage
 - d. Crush blocks (Copper)
 - e. Stops (Mechanical and Hydraulic)
 - 5. Rudder Angle Indicating System
 - 6. Rudder Roll Stabilization System (RRS)

- C. Principles of Operation.
 - 1. How do the components work together to achieve system function?
 - 2. What are the principles of operation of the autopilot?
 - 3. How is the vertical weight of the rudder and rudderstock supported?
 - 4. Explain the transmittal of forces (via the rudder) necessary to cause the ship to change its heading.
 - 5. Explain the difference among the following steering modes:
 - a. Gyro
 - b. Non Follow Up
 - c. Follow Up
 - d. Hand Electric
 - e. Manual (hand pump)

SECTION 1206 – DIESEL ENGINE JACKET WATER SYSTEM (MDE, SSDG)

- A. Reference Material.
 - 1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 - 2. Naval Ships Technical Manual, Chapter 233
 - 3. Manufacturers' Technical Publications, Ship's Information Books, Casualty Control Manual, Ship's Drawings
 - 4. Student Engineer Performance Qualification Guides

- B. Define the following Components and Component Parts (MDE, SSDG):
 - 1. Suction Valves
 - 2. Pump
 - 3. Discharge Valves
 - 4. Jacket Water Cooler
 - 5. Lube Oil Cooler
 - 6. Temperature Regulating Valve
 - 7. Expansion Tank
 - 8. Heat exchanger
 - 9. Intercooler
 - 10. Orifice Plates
 - 11. Jacket Water Heater
 - 12. Gauges and Thermometers
 - 13. Relief Valves

- C. Principles of Operation.
 - 1. Explain how the above components work together to achieve system function.
 - 2. State the importance of the Temperature Regulating Valve (AMOT valve) concerning MDE and SSDG cooling.
 - 3. Explain the importance of conducting a J/W Test.

SECTION 1207 – SEAWATER SYSTEM

- A. Reference Material.
 - 1. Naval Ships Technical Manual, Chapter 233
 - 2. Manufacturers' Technical Publications, Ship's Information Books, Casualty Control Manual, Ship's Drawings
 - 3. Student Engineer Performance Qualification Guide

- B. Define the following System Components and Component Parts:
 - 1. Sea chest
 - 2. Suction and Discharge valve
 - 3. System Cross Connects
 - 4. Overboard discharge valves
 - 5. Auxiliary seawater –reducing station adjusting valve
 - 6. Pressure and temperature gauges
 - 7. Piping (Specify size and material)
 - 8. Sea strainers
 - 9. Vent valves
 - 10. Keel cooler
 - 11. Pumps
 - 12. Deicing valves (if installed)
 - 13. Zincs
 - 14. Sea Bay

- C. Principles of Operation.
 - 1. How do the above components work together to achieve system function?
 - 2. What is the effect of a clogged sea chest?
 - 3. What are the indications of a clogged sea chest?
 - 4. What is the effect of an air bound sea chest?
 - 5. Describe the difference between a Sea Bay and a Sea Chest and its associated advantages and disadvantages.

- D. System Interface. How does this system interface with the following:
 - 1. Main Propulsion Diesel Engine Cooling System
 - 2. Main Gas Turbines
 - 3. Ship's Service Diesel Generator (SSDG) Engine
 - 4. Emergency Diesel Generator (EDG)/Emergency Gas Turbine (EGT)
 - 5. Main Reduction Gear Cooling System
 - 6. Water purification Unit
 - 7. Firemain
 - 8. Air Conditioners
 - 9. Reefers
 - 10. Oily Water Separator
 - 11. Bilge and Ballast System
 - 12. CPP System
 - 13. Shaft Seals
 - 14. Fin Stabilizers
 - 15. Sewage System
 - 16. Installed Weapons Systems

SECTION 1208 – FUEL OIL AND LUBE OIL SYSTEMS**A. Reference Material.**

1. Naval Engineering Manual, COMDTINST M9000.6 (series)
2. Vessel Environmental Manual, COMDTINST M16455.1 (series)
3. Naval Ships Technical Manual, Chapters 262, 505, 541, 542, and 571
4. USCG SFLC Fuel Testing Program Website
5. Cutter Damage Control Book and Drawings
6. Manufacturers' Technical Publications, Ship's Information Books, Casualty Control Manual, Ship's Drawings
7. Student Engineer Performance Qualification Guides

B. State the purpose of the following:

1. Fuel and Water Report
2. NAVY Oil Analysis Program (NOAP)
3. SFLC Fuel Testing Program
4. Lube Oil Test Log

C. Define the following terms:

- | | |
|---|---|
| 1. F-76 (MIL-SPEC fuel product) | 28. MIL-L-2104 |
| 2. JP5 (F-44) Aviation fuel | 29. Lube Oil Pump |
| 3. NPD-MGO (Navy Purchase Description-Marine Gas Oil) | 30. Lube Oil pump (standby/emergency) |
| 4. Cetane index | 31. Lube Oil filter and strainer |
| 5. Cetane requirements | 32. Lube Oil cooler |
| 6. Viscosity | 33. Unloading Valve |
| 7. Vapor pressure | 34. Lube Oil Pre-Lube Pump |
| 8. Atomization | 35. Lube Oil Sample Valves |
| 9. Combustion | 36. Lube Oil Purifier |
| 10. Flash point | 37. Lube Oil Heater |
| 11. Fire point | 38. Lube Oil Storage/Settling Tanks |
| 12. Pour point | 39. Fuel Oil Filling Piping and Valves |
| 13. Bottom sediment | 40. Fuel Oil Transfer Piping and Valves |
| 14. Spectrographic Analysis | 41. Fuel Oil Storage Tanks and Overflow Tanks |
| 15. MIL-L-9000 | 42. Fuel Oil Service Tanks |
| 16. Fuel Dilution | 43. Fuel Oil Transfer Pump/Hand Priming Pump |
| 17. Emulsion | 44. Oily Water Separator System |
| 18. Gravity Feed | 45. Dirty Oil and Stripping Tanks |
| 19. Coalesce | 46. Sludge Tanks |
| 20. Wedge Action (Bearings) | 47. Fuel Oil Drain Lines |
| 21. "Clear and Bright" | 48. Fuel Oil Manifold |
| 22. Fuel dyes | 49. Fuel Oil Pre-Filter |
| 23. Batch Purification | 50. Fuel Oil Coalescer/Purifier |
| 24. Free Water | 51. Lube Oil & Fuel Oil Emergency Cutout Valves |
| 25. Seybold viscosity | 52. Lube Oil & Fuel Oil Tank Level Indicators |
| 26. Biocide Treatment | 53. Fuel Tank Ballast System |
| 27. Specific Gravity | 54. Dedicated Ballast Tanks |

D. Briefly identify the function of the following equipment:

- | | |
|---------------------------------|-------------------------|
| 1. Hydrometer | 6. Purifier |
| 2. Flash screen | 7. Sight Flow Indicator |
| 3. Water-Indicating Paste | 8. Filter-Separator |
| 4. Tank Level Indicators (TLIs) | 9. Sounding tubes |
| 5. Fuel Oil Filter Coalescer | |

COMDTINST M3502.11C

- E. Explain how lubricating oil protects a system from friction and heat.
- F. Explain the purpose of dyes in fuel products. What does red dye in diesel fuel indicate? What does black or dark brown dye indicate?
- G. Explain the purpose and method of application for the SFLC Fuels Testing Program.
- H. Define and explain typical shipboard fuel problems encountered.
- I. Explain the storage concerns over NPD-MGO fuels.
- J. Explain the methods and reasoning for use of biocide treatments.
- K. Explain the USCG In-Line fuel quality sampling program.
- L. Identify the physical appearance of improperly purified lube oil or contaminated oil.
- M. Identify the process(es) by which a purifier can do its job.
- N. Principles of Operation. What is the functional relationship between the emergency standby and attached lube oil pumps?
- O. System Interface.
 - 1. How does operation of the Ballast, Deballast and Stripping System affect the fuel system?
 - 2. How do variations in propulsion engine RPM effect lube oil and fuel oil parameters?
- P. Safety Hazards. Explain the appropriate safety precautions and procedures that apply when:
 - 1. Shifting duplex strainers
 - 2. Opening and closing system valves
 - 3. Transferring Fuel Oil and Lube Oil
 - 4. Fueling at Sea and Inport
 - 5. Ballasting and Deballasting
- Q. State the procedures for the storage and handling of lube oil, fuel oil, hydraulic oil, and JP-5.
- R. What are the procedures if you observe a sheen in the water around or near your cutter or boat? Are the procedures different if you have a fuel/oil spill during onload?

SECTION 1209 – COMPRESSED AIR SYSTEM (LOW PRESSURE, HIGH PRESSURE, AND STARTING AIR)

- A. Reference Material.
1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 2. Naval Ships Technical Manual, Chapter 551
 3. Damage Control Book and Drawings
 4. Manufacturers' Technical Publications, Ship's Information Books, Casualty Control Manual, Ship's Drawings
 5. Student Engineer Performance Qualification Guides
- B. Define the following System Components and Component Parts. State the function, associated safety precautions, and relationship of the following items to the Low Pressure, High Pressure, and Starting Air Systems:
1. Air compressors (LP, HP, Start)
 2. Air receivers/accumulators
 3. Relief valves
 4. Air dehydrator
 5. Receiver Blowdowns
 6. Moisture separators
 7. Controller
 8. Air Flask
 9. Intercooler
 10. Alternate Sources of Air
 11. Cross-connect valves
 12. Cut Out Valves
 13. Unloader
 14. In-line oilers
 15. Water Flask
 16. Regulators
 17. Reducing Stations
- C. Principles of Operation.
1. Explain how the above components work together to achieve system function.
 2. Explain the importance of regular receiver blowdowns.

SECTION 1210 – CATHODIC PROTECTION

- A. Reference Material:
 - 1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 - 2. Naval Ships Technical Manual, Chapter 633
 - 3. Manufacturers' Technical Publications

- B. What is corrosion?

- C. What are the key elements of corrosion?

- D. What are the two basic types of corrosion?

- E. Explain the corrosion circle and define each item.

- F. What are the four basic methods for controlling corrosion?

- G. Sacrificial Anode Cathodic Protection System.
 - 1. What is the principle behind this system?
 - 2. Do we use this type of system in the Coast Guard?
 - a. Which classes of Coast Guard vessels, if any, use sacrificial anodes?
 - b. What other places can this system be found?
 - 3. What are the advantages of this system?
 - 4. What are the disadvantages of this system?
 - 5. What are the key components of this system?
 - 6. Installation:
 - a. Where are anodes installed when used in exterior hull applications?
 - (1) Steel
 - (2) Aluminum
 - b. Where are anodes installed when used in interior applications?
 - c. Are the anodes painted or bare? Why?
 - 7. What are the maintenance requirements?

- H. Impressed Current Cathodic Protection (ICCP) System.
 - 1. What is the principle behind this system?
 - 2. Do we use this type of system in the Coast Guard?
 - a. Which classes of Coast Guard vessels, if any, use ICCP?
 - 3. What are the advantages of this system?
 - 4. What are the disadvantages of this system?
 - 5. What are the key components of this system?
 - 6. What can happen if it is installed improperly?
 - 7. When are the only times ICCP system is secured?
 - 8. When is the ICCP system inspected?

SECTION 1211 – US COAST GUARD ENVIRONMENTAL POLICY

- A. Reference Material.
1. Vessel Environmental Manual, COMDTINST M16455.1 (series)
 2. Hazardous Waste Management Manual, COMDTINST M16478.1 (series)
 3. Asbestos Exposure Control Manual, COMDTINST M6260.16 (series)
 4. Safety and Environmental Health, COMDINST M5100.47 (series)
 5. Coatings and Colors Manual, COMDTINST M10360.3 (series)
 6. Commanding Officer's Environmental Guide, COMDTPUB P5090.1 (series)
 7. www.epa.gov
 8. www.imo.org
- B. International Maritime Organization. What is MARPOL 73/78?
1. What are the 6 annexes of MARPOL 73/78?
 2. Does this apply to the Coast Guard? If so, how?
- C. Clean Water Act.
1. What is the Clean Water Act?
 2. What is the Uniform National Discharge Standards (UNDS) as defined by the Environmental Protection Agency? Why is the UNDS program needed?
- D. Clean Air Act.
1. What is the Clean Air Act?
 2. How many tier categories are there for marine diesel engines?
 3. What are these categories called and what do they signify?
 4. What are the requirements for operating the incinerator during the following times:
 - a. Underway
 - b. Inport
 - c. What is authorized to be burned in the incinerator?
- E. Summarize the Coast Guard's Sustainability, Environmental, and Energy Policy Statement.
- F. What is the relationship of the Vessel Environmental Manual (VEM) with legislation and policies listed above?
- G. Summarize the garbage management practices for all Coast Guard vessels.
- H. OWS Operation.
- a. Are you authorized to operate the OWS within 3 nm of land? If so, what requirements must be met?
 - b. Explain IMO Marine Environmental Protection Committee (MEPC) 107(49) as it relates to the OWS.
 - c. Is the OWS onboard your cutter MEPC 107(49) compliant?
- I. What actions do you take if asbestos containing material (ACM), polychlorinated biphenyls (PCBs) or lead based paint (LBPs) have been indentified at your unit?
1. What is the purpose of an Asbestos Management Plan?
 2. What are the proper disposal methods of ACM, PCBs and LBPs?
 3. Can you handle and dispose of these materials at the unit level?
 4. What procedures are to be followed when handling and disposing of the above listed material?
- J. Pollution Response
- a. What are your initial actions when you find hazardous waste (oil, fuel, hydraulic oil, etc) spilled or a sheen in the water?
 - b. Who do you call?
 - c. How do you report the spill?
 - d. Where can you determine if a Pollution Report (POLREP) is required?
 - e. What are your follow up actions to ensure full environmental compliance?

SECTION 1212 – BALLAST, DEBALLAST, AND STRIPPING SYSTEM

- A. Reference Material.
 - a. Naval Engineering Manual, COMDTINST M9000.6 (series)
 - b. Vessel Environmental Manual, COMDTINST M16455.1 (series)
 - c. Naval Ships Technical Manual, Chapters 079 (V1), 541
 - d. Cutter Damage Control Book and Drawings
 - e. Manufacturers' Technical Publications, Ship's Information Books, Casualty Control Manual, Ship's Drawings
 - f. Student Engineer Performance Qualification Guides

- B. Discuss the following System Components and Component Parts:
 - a. Fuel oil storage tanks
 - b. Ballast, deballast, and stripping/valves
 - c. Bilge and fuel oil stripping pump
 - d. Fuel and Ballast transfer pumps
 - e. Firemain connection
 - f. Bilge Eductors
 - g. Designated ballast tanks
 - h. Sounding Tubes/Vents

- C. What are the requirements for vessels with segregated ballast tanks?

- D. What are the requirements for vessels without segregated ballast tanks?

- E. Explain the advantages/disadvantages of segregated ballast tanks over a non-segregated ballast tanks.

- F. System Interface. Explain how ballast system can be used to maintain optimum draft, trim, and overall vessel stability.

SECTION 1213 – BILGE DRAINAGE SYSTEMS

- A. Reference Material.
 - 1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 - 2. Vessel Environmental Manual, COMDTINST M16455.1 (series)
 - 3. Naval Ships Technical Manual, Chapters 503, 505, 541, and 593
 - 4. Damage Control Book and Drawings
 - 5. Manufacturers' Technical Publications, Ship's Information Books, Casualty Control Manual, Ship's Drawings
 - 6. Student Engineer Performance Qualification Guides

- B. Discuss the following System Components and Component Parts:
 - 1. Bilge Eductors
 - 2. Check Valves
 - 3. Bilge high level alarms
 - 4. Suction Valves and Manifold
 - 5. Suction strainer
 - 6. Overboard Discharge Valves
 - 7. Pumps, Piping, and Valves
 - 8. Dirty Oil Pump
 - 9. Sand Piper
 - 10. Dirty Oil Tank
 - 11. Oily Water Separator (OWS)
 - 12. OWS Monitoring System
 - 13. OWS Filter Stages
 - 14. Oil Content Monitor (OCM)
 - 15. Pneumatic valve
 - 16. Gauges
 - 17. Electrical Controllers

- C. Principals of Operation. Explain how the above components work together to achieve system function.

- D. Safety Hazards.
 - 1. What general safety hazards apply to this system?
 - 2. What are the shipboard, Federal, and State regulations and procedures for disposing of Oily Waste?

SECTION 1214 – SEWAGE COLLECTION, HOLDING, AND TRANSFER (CHT) SYSTEM

- A. Reference Material.
 - 1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 - 2. Coatings and Color Manual, COMDTINST M10360.3 (series)
 - 3. Vessel Environmental Manual, COMDTINST M16455.1 (series)
 - 4. Naval Ships Technical Manual, Chapters 074 (V3), 593
 - 5. Manufacturers' Technical Publications
 - 6. Student Engineer Performance Qualification Guide

- B. Define the following:
 - 1. Contiguous zone
 - 2. Collection Holding Tank
 - 3. Effluent
 - 4. Sludge
 - 5. Grey water
 - 6. Sewage

- C. Discuss the following System Components and Component Parts:
 - 1. Swing Check Valve
 - 2. Deck/bulkhead stop valve
 - 3. Bypass line
 - 4. Eductors / Vacuum pumps
 - 5. Tank Level Indicators (TLIs)
 - 6. Three Way Valve
 - 7. Sewage Holding Tank
 - 8. Grey Water Collection Tank
 - 9. Water Seal Tank
 - 10. Sewage Holding Tank Discharge
 - 11. Pumps
 - 12. Air Break (or funnel cup)

- D. System Interface.
 - 1. How does this system interface with the setting of "ZEBRA"?
 - 2. How would a vacuum leak affect the system?
 - 3. How would restrictions in the suction and discharge piping effect the system?
 - 4. What are the only authorized items to be flushed down the toilets?

- E. Safety Hazards.
 - a. What special safety precautions must be observed when operating this system?
 - b. What precautions must be taken prior to entering a tank?

- F. Summarize the Coast Guard's pollution control discharge restrictions (table format is acceptable).

SECTION 1215 – POTABLE WATER SYSTEM

- A. Reference Material.
1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 2. Vessel Environmental Manual, COMDTINST M16455.1 (series)
 3. Naval Ships Technical Manual, Chapter 533
 4. Manufacturers' Technical Publications, Ship's Information Books, Casualty Control Manual, Ship's Drawings
 5. Student Engineer Performance Qualification Guides
- B. Discuss the following System Components and Component Parts:
1. Potable water storage tanks
 2. Manifold
 3. Potable water pumps
 4. Priming pumps
 5. Deck risers
 6. Tank level indicators
 7. Chlorinator/Brominator
 8. Hydro pneumatic Tank
 9. Hot Water Accumulator Tank
 10. Dechlorinator
- C. Principals of Operation.
1. How do the components work together to achieve the system's function?
 2. State the proper storage, handling, and use of:
 - a. Bromine Cartridges
 - b. Calcium Hypochlorite
 3. What are established limits and testing frequencies for the following items:
 - a. Chlorine
 - b. Chloride
 - c. Bromine
 - d. PH
 4. State the treatment procedures for potable water using the following methods:
 - a. In-line brominator
 - b. Recirculating brominator
 - c. Batch method
 - d. Superchlorination
- D. System Interface.
1. How does loss of electrical power effect the operation of this system?
 2. How does this system interface with the Bromine Feed System?
- E. Safety Hazards.
1. Potential hazards of unlocked sounding tube access.
 2. Discuss the use of dedicated sounding tapes.
 3. Who maintains the potable water sounding tapes?
 4. Explain how to properly handle potable water safely aboard vessels to prevent waterborne diseases.

SECTION 1216 – WATER PURIFICATION SYSTEM

- A. Reference Material.
1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 2. Vessel Environmental Manual, COMDTINST M16455.1 (series)
 3. Naval Ships Technical Manual, Chapters 531 (V1, V2, V3), 220 (V1, V2)
 4. Manufacturers' Technical Publications, Ship's Information Books, Casualty Control Manual, Ship's Drawings
 5. Student Engineer Performance Qualification Guides
- B. Define the following:
- | | |
|----------------------------|------------------------------------|
| 1. Distillation | 21. Vacuum Pump |
| 2. Evaporation | 22. Relief Valve |
| 3. Condensation | 23. Temperature Regulator |
| 4. Feed | 24. Condensate Pump |
| 5. Vapor | 25. De Superheater |
| 6. Feedwater Treatment | 26. Feed Valve |
| 7. Distillate | 27. Salinity Indicator |
| 8. Brine | 28. Solenoid Valve |
| 9. Potable Water | 29. Air Ejectors |
| 10. Salinity Cell | 30. Seawater Feed Pump |
| 11. Salinity Indicator | 31. Distillate Cooler |
| 12. Reverse Osmosis System | 32. Automatic Dump Valve |
| 13. Permeate | 33. Air eductor |
| 14. Membranes | 34. Overboard Discharge Valve |
| 15. Vapor Separators | 35. Suction Valves |
| 16. Distillate Condenser | 36. Superheater |
| 17. Air ejector Condenser | 37. Array Filters |
| 18. Seawater Heater | 38. High Pressure Pump (RO System) |
| 19. Distillate Pump | 39. Low Pressure Pump (RO System) |
| 20. Brine Pump | |
- C. Explain the basic difference between the following types of water purification systems:
1. Flash
 2. Low-pressure submerged tube
 3. Vapor-compression
 4. Reverse Osmosis
- D. State the restrictions for distilling potable water when astern of another vessel or when in close proximity to land.
- E. Principals of Operation. How do the above components work together to achieve the function of producing distillate?
- F. Safety Hazards.
1. Why are there requirements for maintaining the 1st stage vacuum?
 2. What is the set value?

SECTION 1217 – SHIP SERVICE BOILER SYSTEM

- A. Reference Material.
1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 2. Vessel Environmental Manual, COMDTINST M16455.1 (series)
 3. Naval Ships Technical Manual, Chapters 220 (V1 & V2), 225
 4. Manufacturers' Technical Publications, Ship's Information Books, Casualty Control Manual, Ship's Drawings
 5. Student Engineer Performance Qualification Guide
- B. Discuss the following Components and Components Parts:
1. Boiler Fuel Pump and Regulators
 2. Fuel Solenoid Valve
 3. Feedwater Pumps
 4. Coolers
 5. Relief Valves
 6. Make-up Feedwater Pump
 7. Sight Glasses
 8. Condensate Tank
 9. Steam Shoretie Connections
 10. Chemical Treatment
 11. Fusible Plug
 12. Fire Tube Boiler
 13. Water Tube Boiler
- C. Principals of Operation. Explain how the above components work together to achieve system function.
- D. System Interface.
1. How do the following outside influences affect this system?
 - a. Loss of electrical power
 - b. Loss of Auxiliary S/W pressure
 - c. Loss of F/O boost system pressure
 - d. Atmospheric pressure/Engine room vent changes
 2. How does this system interface with the Feedwater system?

SECTION 1218 – REFRIGERATION SYSTEM

- A. Reference Material.
1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 2. Vessel Environmental Manual, COMDTINST M16455.1 (series)
 3. Naval Ships Technical Manual, Chapters 510 and 516
 4. Manufacturers' Technical Publications, Ship's Information Books, Casualty Control Manual, Ship's Drawings
 5. Student Engineer Performance Qualification Guides
- B. Define the following terms:
1. High Pressure side
 2. Low Pressure side
 3. Refrigerant
 4. British Thermal Unit (BTU)
 5. Super heat
 6. Sensible heat
 7. Liquid Floodback
 8. Latent Heat of Vaporization
 9. Compressor(s)
 10. Low-temperature switch
 11. Low L/O Pressure switch
 12. Chilled water pump(s)
 13. Strainer(s)
 14. Water Regulating Valves (WRV)
 15. Thermostatic Switch
 16. Seawater reducing station
 17. Water failure cutout switch
 18. Thermostatic expansion valve (TXV)
 19. Evaporator (chiller/freezer box)
 20. Rupture Disk
 21. Receiver
 22. King Solenoid valve
 23. Condenser
 24. Heat exchanger(s)
 25. Dehydrator
 26. Evaporator Pressure Regulator valve (EPR)
 27. Expansion valves
 28. High pressure cutout switch
 29. Low pressure cutout switch
 30. Compressor capacity control
 31. Unloader
 32. Hot Gas Circuit
 33. Refrigerant Recycling
- C. Principals of Operation. Using a line diagram, describe the path of:
1. Refrigerant from the compressor discharge through the system and back to the compressor suction (Indicating the places where it changes states)
 2. Chilled water from the pump discharge through the system and back to the pump suction
 3. Defrost drainage
 4. Refrigerant emergency overboard relief
- D. Safety Hazards.
1. What special safety hazards apply to charging and handling refrigerant?
 2. What special safety devices are associated with the chiller?
 3. Describe current refrigerant reclamation requirements.

SECTION 1219 – AIR CONDITIONING AND CHILLER SYSTEM

- A. Reference Material.
 - 1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 - 2. Vessel Environmental Manual, COMDTINST M16455.1 (series)
 - 3. Naval Ships Technical Manual, Chapter 510
 - 4. Manufacturers' Technical Publications, Ship's Information Books, Casualty Control Manual, Ship's Drawings
 - 5. Student Engineer Performance Qualification Guides

- B. Discuss the following System Components and Component Parts:
 - 1. A/C Sea Water Pump
 - 2. Chill Water Pump
 - 3. Chill Water Loop Cross-Connect System
 - 4. Chilled Water Head Tanks
 - 5. Auxiliary S/W to A/C S/W Cross Connect
 - 6. A/C Compressors
 - 7. Thermal Expansion Valve (TXV)
 - 8. Chiller
 - 9. Heat Exchanger
 - 10. Condenser
 - 11. Refrigeration Gas Systems
 - 12. Chilled Water Expansion Tank
 - 13. Chiller low temperature cutout

- C. System Interface.
 - 1. How do the following outside influences affect this system?
 - a. Loss of Electrical Power.
 - b. Loss of Chilled Water Pressure.
 - c. Loss of S/W Cooling System Pressure.
 - 2. How does this system interface with the Auxiliary S/W system?
 - 3. How does the chill water system interface with the heating system?
 - 4. How does this system interface with shipboard vital spaces?

- D. Safety Hazards.
 - 1. What are the general safety hazards that apply to this system?
 - 2. What type of inhibitor is used in the chill water system?

SECTION 1220 – HEATING AND VENTILATION SYSTEM

- A. Reference Material.
 - 1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 - 2. Naval Ships Technical Manual, Chapters 510 and 512
 - 3. Manufacturers' Technical Publications, Ship's Information Books, Casualty Control Manual, Ship's Drawings
 - 4. Student Engineer Performance Qualification Guides

- B. Discuss the following System Components and Component Parts:
 - 1. Forced Ventilation Units
 - a. Ducting
 - b. Fans/blowers
 - c. Flash Arrestors
 - d. Ventilation closures
 - e. Vent screens
 - f. Air filters
 - 2. Vent Duct Heaters
 - a. Insulation
 - b. Heating coils
 - 3. Steam Heaters
 - a. Supply valve
 - b. Drain valve
 - c. Steam trap
 - d. Coil fins
 - e. Heating coil fins
 - 4. Grease Interceptor
 - a. Damper control switch
 - b. Trap
 - c. Drain gutter
 - 5. Electrical Unit Heaters
 - a. Power supply
 - b. Unit coils
 - 6. Fan Coil Units (FCU)
 - a. Filter
 - b. Coil
 - c. Trapped air-bleeding
 - d. Draining line

- C. Describe the operation and use of two steam traps:
 - 1. Mechanical (Ball / Bucket)
 - 2. Thermostatic

- D. Explain how to set Positive and Negative ventilation in all Engineering Spaces.
 - 1. When would we set negative ventilation?
 - 2. When would we set positive ventilation?

- E. System Interface.
 - 1. Explain the process to shift the cutter chill water system from cooling to heating.
 - 2. Explain the interface between the ship's boiler system and hot water supply to FCUs.

SECTION 1221 – ELECTRICAL DISTRIBUTION SYSTEM

- A. Reference Material.
1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 2. Naval Ships Technical Manual, Chapters 300, 302, 310, 320, 330, 400, and 491
 3. Manufacturers' Technical Publications, Ship's Information Books, Casualty Control Manual, Ship's Drawings
 4. Student Engineer Performance Qualification Guides
 5. This Manual, Section 1102 – Electrical Fundamentals
- B. Discuss the following System Components and Component Parts:
1. Ships Service Generator
 2. Generator Switchboards
 3. Bus Ties and Breakers
 4. Distribution and Load Centers
 5. Synchroscope
 6. Manual Voltage Adjust Rheostat
 7. Droop/Isochronous Switch
 8. Circuit Breaker Mechanical Interlock
 9. Speed Control Potentiometer
 10. Automatic and Manual Bus Transfers
 11. Emergency Generator SWBD
 12. Vital/Non-Vital Circuits
 13. Generator Breakers
 14. Voltage Regulator
 15. Automatic Voltage Adjust Rheostat
 16. Phase Sequence Indicator
 17. Reverse Power Relays
 18. Voltmeter Switch
 19. Ground Detector Indicators
 20. Synchronizing Mode Select Switch
- C. Principles of Operation.
1. Explain how the above components work together to achieve system function.
 2. What are the sources of power for semi-vital and vital loads using ABTs and MBTs?
 3. What is the function of an ABT? MBT?
 4. What are the principles of overcurrent devices (i.e. Time vs. Amps)?
 5. Explain how the 400HZ Distribution System functions, and how it interfaces with the 60HZ Distribution System.
 6. Explain how generators operate in parallel in terms of voltage and frequency.
- D. System Interface.
1. How do the following outside influences affect this system:
 - a. Loss of Shore Power
 - b. Loss of Cooling Water to online unit
 - c. Load variations
 2. What is loop current? Eddy Current? Self exciting/external excitation?
- E. Protection Devices.
1. State the advantages of fuses vs. circuit breakers.
 2. What is single phasing? Loss of phasing?
 3. What is the difference between marine and shore electrical systems? (i.e. Wye vs. Delta Connections, ungrounded vs. grounded, volt/amp relationship, power factor, 3 phase vs. 1 phase power).

SECTION 1222 – INTERIOR COMMUNICATIONS SYSTEM

- A. Reference Material.
 - 1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 - 2. Naval Ships Technical Manual, Chapter 430
 - 3. Manufacturers' Technical Publications, Ship's Information Books, Casualty Control Manual, Ship's Drawings
 - 4. IC Electrician, Volume I, NAVEDTRA 14120
 - 5. Student Engineer Performance Qualification Guides

- B. Discuss the following System Components and Component Parts:
 - 1. Ships Telephone System
 - 2. Sound Power Telephones
 - a. List all Sound Powered Phone circuits aboard local cutter.
 - b. Discuss the purpose and use of each Sound Powered Phone circuit.
 - 3. 1 MC
 - 4. 21 MC
 - 5. Engine Order Telephone (EOT)
 - 6. Emergency Bells
 - 7. Salt and Pepper Line (X40J)
 - 8. VHF Radio
 - 9. Messenger
 - 10. WIFCOM
 - 11. Switchbox
 - 12. Jackbox
 - 13. Selector Switches
 - 14. Primary Circuit
 - 15. Auxiliary Circuit
 - 16. Supplementary Circuits
 - 17. E-call System
 - 18. Fiber Optic Cables and Connectors

- C. Principle of Operation.
 - 1. What is the primary purpose of the 1MC?
 - 2. What is the primary purpose of the 21MC?
 - 3. Where do you find X40J connection points?
 - 4. What is the proper protocol for transmitting and receiving communications on a sound powered phone?

- D. Protective Devices. Why is it important to ensure the cap is on the sound powered phone jack when not in use?

SECTION 1223 – GYROCOMPASS SYSTEM

- A. Reference Material.
 - 1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 - 2. Naval Ships Technical Manual, Chapter 420
 - 3. Manufacturers' Technical Publications, Ship's Information Books, Casualty Control Manual, Ship's Drawings
 - 4. Student Engineer Performance Qualification Guides

- B. Define the following:
 - 1. Precession
 - 2. Apparent rotation
 - 3. Tumble

- C. State the three degrees of freedom exhibited by a gyroscope.

- D. Describe the effects of the earth's rotation on a free-spinning gyroscope.

- E. Explain how corrective forces (torques) are generated and can change a gyroscope into a gyrocompass that accurately seeks/indicates true North.

- F. Explain how roll and pitch information is generated by a gyrocompass and how this information is used.

- G. System Components and Component Parts. State the function of the following system components and component parts:
 - 1. Master gyrocompass
 - 2. Control cabinet
 - 3. Synchro amplifier
 - 4. Repeater(s)
 - 5. Standby power supply
 - 6. Alarms and annunciators

- H. System Interface.
 - 1. How does loss of electrical power affect this system?
 - 2. How does this system interface with the following:
 - a. Fire Control Systems
 - b. Navigation Systems

SECTION 1224 – FIREMAIN SYSTEM

- A. Reference Material.
 - 1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 - 2. Naval Ships Technical Manual, Chapter 079 (V1) & 555 (V1)
 - 3. Cutter Damage Control Book and Drawings
 - 4. Manufacturers' Technical Publications, Ship's Information Books, Casualty Control Manual, Ship's Drawings
 - 5. Student Engineer Performance Qualification Guides

- B. Discuss the following System Components and Component Parts:
 - 1. Fire Pumps
 - 2. Pressure Regulating Valve
 - 3. Firemain Isolation Valves
 - 4. Firemain Cross Connect Valves
 - 5. Automatic Regulating Valves
 - 6. Strainers
 - 7. Fire Stations

- C. Principles of Operation.
 - 1. How do the above components work together to achieve system function?
 - 2. State the operating theory of the fire pumps' automatic pressure regulator valve.

- D. System Interface.
 - 1. Discuss how energizing fire pump with a F/M shoretie on the line affects this system.
 - 2. Discuss how this system interfaces with the following systems:
 - a. AFFF System
 - b. Magazine Sprinkler
 - c. Counter Measure Washdown
 - d. Ballast/Deballast
 - e. Auxiliary Sea Water
 - f. Secondary Drainage
 - g. LP Air
 - h. Emergency Drainage

SECTION 1225 – AQUEOUS FILM FORMING FOAM (AFFF) SYSTEM

- A. Reference Material.
 - 1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 - 2. Naval Ships Technical Manual, Chapter 079 (V1) & 555 (V1)
 - 3. Cutter Damage Control Book and Drawings
 - 4. Manufacturers' Technical Publications, Ship's Information Books, Casualty Control Manual, Ship's Drawings
 - 5. Student Engineer Performance Qualification Guides

- B. Discuss the following System Components and Component Parts:
 - 1. AFFF Tank
 - 2. Proportioner
 - 3. Balancing Valve
 - 4. Manual Bypass
 - 5. Motor Operated Valves

- C. What are the two AFFF concentration percentages authorized for use onboard Coast Guard cutters?

- D. Safety Hazards.
 - 1. What general safety hazards apply to this system?
 - 2. What are disposal procedures for AFFF? Discuss both regular and emergency disposal.

SECTION 1226 – AVIATION JP-5 FUEL SYSTEM

- A. Reference Material.
 - 1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 - 2. Shipboard–Helicopter Operational Procedures Manual, COMDTINST M3710.2 (series)
 - 3. Vessel Environmental Manual, COMDTINST M16455.1 (series)
 - 4. Naval Ships Technical Manual, Chapter 542
 - 5. Manufacturers’ Technical Publications, Ship’s Information Books, Casualty Control Manual, Ship’s Drawings
 - 6. Student Engineer Performance Qualification Guides

- B. Discuss the following Components and Component Parts:
 - 1. Service and Transfer Pumps
 - 2. Service and Transfer Tanks
 - 3. Filter Separators
 - 4. GO-NO-GO Filter
 - 5. Piping and Valves
 - 6. Fuel Meter
 - 7. Stripping and Recirculation Pump
 - 8. Electrical Controllers
 - 9. Helicopter In-Flight Refueling (HIFR) Rig
 - 10. AEL MK I tester
 - 11. AEL MK III tester

- C. Principles of Operation.
 - 1. State how the above components work together to achieve system function.
 - 2. State the importance of maintaining clean JP-5 fuel and the importance of recirculation and stripping the service and storage tanks prior to servicing Helicopters.
 - 3. List the equipment that is required when conducting a HIFR.
 - 4. State the procedures and safety precautions for conducting a HIFR, HOT FUEL, or normal refueling.
 - 5. State the requirements for conducting JP-5 lab tests.
 - 6. What is the Flash Point of JP-5?
 - 7. State the requirements for using non-sparking tools in or near the vicinity of JP-5.

SECTION 1227 – MISCELLANEOUS AUXILIARY EQUIPMENT

- A. Reference Material.
1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 2. Vessel Environmental Manual, COMDTINST M16455.1 (series)
 3. Applicable Naval Ships Technical Manual chapters; refer to Chapter 001, Publication Index.
 4. Manufacturers' Technical Publications, Ship's Information Books, Casualty Control Manual, Ship's Drawings
 5. Student Engineer Performance Qualification Guides
- B. Anchor Windlass.
1. What is the function of this system (Wildcat Engaged v/s Wildcat Disengaged)?
 2. Discuss the following System Components and Component Parts:
 - a. Master Switch
 - b. Wildcat Clutch Lever
 - c. Locking Pin
 - d. Wildcat Brake Handwheel
 - e. Bevel drive and driveshaft
 3. Principles of Operation.
 - a. State how the above components work together to achieve system function.
 - b. Describe the following modes of operation:
 - (1) Electrical Control
 - (2) Wildcat Clutch Control
 - (3) Wildcat Brake Control
 - (4) Electric Disc Brake Control
 4. Safety precautions.
 - a. What general safety precautions apply to this system?
 - b. How is the load on a SSDG affected by Anchor Windlass operations?
- C. Warping Capstan.
1. What is the function of this system?
 2. Discuss the following System Components and Component Parts:
 - a. Capstan Head
 - b. Disc Brake
 - c. Motor Reducer
 - d. Bevel drive and drive shaft
 - e. Master Switch Control
 3. Principles of Operation. State how the above components work together to achieve system function.
 4. Safety Hazards.
 - a. What general safety precautions apply to this system?
 - b. How is the load on a SSDG affected by system operation?
- D. Twin Pivot Arm Davit.
1. What is the function of this system?
 2. Discuss the following System Components and Component Parts:
 - a. Wire rope falls and fittings
 - b. Davit arms
 - c. Hydraulic Cylinders/ Rams
 - d. Hoist Winch
 - e. Constant Tension Winches
 - f. Hydraulic Reservoir
 - g. Hydraulic Charging Circuit
 - h. Hydraulic Power Unit (HPU)
 - i. Hydraulic Accumulators for emergency luffing
 - j. Emergency Luffing Control Valve
 - k. Davit Head Unit

COMDTINST M3502.11C

- l. Electric Control Panels
 - m. Hydraulic Valve Panel
 - n. Data Display Panel
 - o. Emergency Stop Button
 - p. Main Davit Controls
 - q. Tension Winch Controls
 - r. Luffing Controls
 - s. Auxiliary Controls
 - t. Limit Switches/Anti two-block devices
 - u. Boat Grips
 - v. Boat Cradle
 - w. Emergency Stops
 - x. Brake Override
3. Principles of Operation. State how the above components work together to achieve system function.
 4. Safety Precautions.
 - a. What general safety precautions apply to this system?
 - b. How is the load on a SSDG affected by system operation?
 - c. What is the normal hoisting weight of this system?
- E. Single Point Davit.
1. What is the function of this system?
 2. Discuss the following System Components and Component Parts:
 - a. Mast
 - b. Base
 - c. Inner Boom/Outer Boom
 - d. Winch
 - e. Fairleader
 - f. Hydraulic Power Unit (Pump, Motor Reservoir, motor controller)
 3. Principles of Operation. State how the above components work together to achieve system function.
 4. Safety Precautions.
 - a. What general safety precautions apply to this system?
 - b. How is the load on a SSDG affected by system operation?
 - c. What is the normal hoisting weight of the system?
- F. Cutter Cranes.
1. What is the function of this system?
 2. Discuss the following System Components and Component Parts:
 - a. Crane Boom
 - b. Crane Winches
 - c. Stops/Automatic Cutout Devices
 - d. Wire Rope/Rigging
 - e. Turrent and Swing Drives
 - f. Crane Controls
 3. Principles of Operation.
 - a. State how the above components work together in this system.
 - b. How does this system integrate with the buoy handling system?
 - c. State the locations and methods of crane control.
 - d. What are the rated speeds and load limits of crane operation?
 - e. What system provides power for crane operations? Discuss method of power transmission.
 4. Safety Precautions.
 - a. What general safety precautions apply to this system?
 - b. Discuss the importance of the crane rigging system.
- G. Cross Deck Winch System.
1. What is the function of this system?
 2. Discuss the following System Components and Component Parts:

- a. Hydraulic Motor
 - b. Brake
 - c. Planetary Gearbox
 - d. Winch Drum
 - e. Warming Head
 - f. Drum Jaw Clutch
 - g. Tension Display
3. Principles of Operation.
 - a. State how the above components work together in this system.
 - b. How does this system integrate with the buoy handling system?
 4. Safety Precautions. What general safety precautions apply to this system?
- H. Buoy Mooring Chain and Sinker Handling System.
1. What is the function of this system?
 2. Discuss the following System Components and Component Parts:
 - a. Chain Stoppers (Mechanical/Hydraulic)
 - b. Rising Sheave Assembly
 - c. Chain Winch
 3. Principles of Operation.
 - a. State how the above components work together in this system.
 - b. How does this system integrate with the buoy handling system?
 4. Safety Precautions.
 - a. What general safety precautions apply to this system?
 - b. What specific safety concerns involve the recovery of excessive weights?
- I. Buoy Gripping System.
1. What is the function of this system?
 2. Discuss the following System Components and Component Parts:
 - a. Hydraulic Cylinder
 - b. Self adjusting Sheave
 - c. Wire Rope Assembly and Grab Hook Clevis
 3. Principles of Operation.
 - a. State how the above components work together to achieve system function.
 - b. How does this system integrate with the buoy handling system?
 4. Safety Precautions.
 - a. What general safety precautions apply to this system?
 - b. What specific safety devices prevent over-tension?
- J. Self-Contained Breathing Apparatus (SCBA) Compressors.
1. What is the function of this system?
 2. Discuss the following System Components and Component Parts.
 - a. Drive Engine
 - b. Compressor Unit
 - c. Pre-filter Assembly
 - d. P1 Purification System
 - e. Hose Fill Assemblies
 3. Principles of Operation.
 - a. State how the above components work together to achieve system function.
 - b. State the procedure for filling SCBA cylinders.
 4. Safety Precautions.
 - a. What general safety precautions apply to this system?
 - b. What actions are required when oil residue is detected in delivered air?
 - c. What actions are required if compressor fails to achieve rated final pressure?
 - d. What are the procedures for SCBA air quality testing?
 - e. How are air quality discrepancies corrected?

COMDTINST M3502.11C

K. Telescopic Helicopter Hangars.

1. What is the function of this system?
2. Discuss the following System Components and Component Parts.
 - a. Hangar Drive Assembly
 - b. Door Drive Assembly
 - c. Track Assembly
 - d. Door Assembly
3. Principles of Operation.
 - a. State how the above components work together to achieve system function.
 - b. State the environmental limits for hangar operation.
4. Safety Precautions.
 - a. What general safety precautions apply to this system?
 - b. What is the procedure for retracting and extending the hangar?
 - c. What is the procedure for opening and closing the door?

L. Cutter Incinerators.

1. What is the function of this system?
2. Discuss the following System Components and Component Parts:
 - a. Burner
 - b. Flue Gas Fan
 - c. Flue Gas Damper
 - d. Sludge Burner
 - e. Sludge Burner Valve
 - f. Sludge Tank
 - g. Circulating Pump
 - h. Thermostat
 - i. Electrical Heater
3. Principles of Operation.
 - a. State how the above components work together to achieve system operation.
 - b. What actions are required for a malfunctioning sludge dosage valve?
 - c. How are remnants of particulate matter in the gas flow neutralized?
4. Safety Precautions.
 - a. What general safety precautions apply to this unit?
 - b. How are remnants of particulate matter in the gas flow neutralized?
 - c. What actions are required for a "Flame Failure" alarm?
 - d. What actions are required for Flue Gas Temp or Combustion Chamber Temp High Temperature alarms?

M. Small Boat Stern Launch and Recovery System.

1. What is the function of this system?
2. Discuss the following System Components and Component Parts:
 - a. Stern Notch
 - b. Overhead Traveling Crane
 - c. Boat Hoist Trolley Carriage(s)
 - d. Small Boat Cradles
 - e. Capture/Carriage Winches
 - f. Stern Doors
 - g. Controls, Interlocks, and Human Interface
3. Principles of Operation.
 - a. State how the above components work together to achieve system operation.
 - b. How does this system integrate with the other portions of the small boat handling facilities on the cutter?
 - c. State the procedure(s) for using the system, including:
 - (1) Launching of the small boat(s)
 - (2) Recovery of the small boat(s)
 - (3) Traversing and stowage of the small boat(s)

- d. Describe the difference between the NSC Stern Launch and Recovery System versus other stern launch and recovery systems in the Coast Guard.
 4. Safety Precautions.
 - a. What general safety precautions apply to this system?
 - b. State the environmental limits of operation for this system.
 - c. What advantages and disadvantages does this system provide in regards to small boat operations?
 - d. What emergency procedures exist for the system?
- N. Fin Stabilization System(s).
1. What is the function of this system?
 2. Which cutter classes have Fin Stabilizing Systems?
 3. Discuss the following System Components and Component Parts:
 - a. Fin Stabilizers
 - b. Rudder Roll Stabilizers (if any)
 - c. Hydraulic Power Unit
 - d. Control system
 - e. Gain and Speed Controls
 - f. Automatic and Manual Operation Modes
 - g. Inflatable Boot
 - h. Manual hand Pump
 4. Principles of Operation.
 - a. State how the above components work together to achieve system operation.
 - b. How does this system integrate with the other portions of the cutter's propulsion system.
 - c. State the procedure(s) for using this system.
 5. Safety Precautions.
 - a. What general safety precautions apply to this system?
 - b. State the environmental limits of operation for this system.
 - c. What advantages and disadvantages does this system provide?
 - d. What emergency procedures exist for this system?
 - e. What precautions should be followed prior to maintenance being performed on the system?

SECTION 1301 – REQUIRED TASKS

SIGNATURE/DATE

A. COMPLETE THE PERSONNEL QUALIFICATION STANDARD FOR BASIC DAMAGE CONTROL (NAVEDTRA 43119 (SERIES)) WITHIN 3 MONTHS OF REPORTING ABOARD.

B. COMPLETE THE ON SCENE LEADER AND REPAIR PARTY LEADER SECTIONS OF ADVANCED DAMAGE CONTROL EMERGENCY PARTIES PERSONNEL QUALIFICATION STANDARD (NAVEDTRA 43119 (SERIES)).

C. CASUALTY CONTROL

1. Demonstrate ability to recognize and associate casualty symptoms on the respective machinery and systems outlined in the Casualty Control Manual.
2. At the following positions, successfully demonstrate proficiency in executing initial response and remedial action procedures for the machinery and systems outlined in the Casualty Control Manual.
 - a. Oiler
 - b. Throttleman
 - c. Engineer of the Watch

D. SUCCESSFULLY PASS THE CHAPTER 1 BASIC SHIPBOARD ENGINEERING KNOWLEDGE WRITTEN TEST WITHIN 1 YEAR OF REPORTING ABOARD.

E. QUALIFY AS SYSTEM OPERATOR ON THE FOLLOWING NON-WATCH STATION EQUIPMENT:

1. Oily Water Separator (OWS)
2. Fuel Oil Purifier (FOP)
3. Lube Oil Purifier (LOP)
4. Boiler Feedwater Treatment
5. Incinerator

F. QUALIFICATION AS A FUEL OIL AND WATER KING IS STRONGLY RECOMMENDED, BUT AS A MINIMUM GAIN FAMILIARITY WITH DUTIES AND RESPONSIBILITIES BY SHADOWING THE FOWK DURING THE FOLLOWING EVOLUTIONS:

1. Complete all required FOWK drawings
2. Transfer Fuel Between Storage & Service Tanks
3. Stripping Service Tanks
4. On load of Fuel (Including Aviation Fuel)
5. Conduct JP-5 Testing IAW Chapter 8 of the Shipboard-Helicopter Operational Procedures Manual, COMDTINST M3710.2 (series)
6. Create Daily Liquid Loading Report
 - a. Conduct Soundings
 - b. Enter data into FCCS

G. COMPLETE THE FOLLOWING TASKS FROM THE BOAT OPERATIONS AND TRAINING (BOAT) MANUAL, VOLUME II, COMDTINST M16114.33

(series):

- 1. ENG-01-01-Type (All Tasks) _____
- 2. ENG-01-04-Type (All Tasks) _____
- 3. ENG-01-05-Type (All Tasks) _____
- 4. ENG-01-06-Type (All Tasks) _____
- 5. ENG-01-07-Type (Tasks 4, 5, & 7 only) _____
- 6. ENG-04-01-Type (All Tasks) _____

H. QUALIFY AS INPORT EOW. _____

I. QUALIFY IN ALL UNDERWAY ENGINEERING WATCHES THROUGH EOW. _____

J. WORK AS A MEMBER OF THE MAIN PROPULSION, AUXILIARY, ELECTRICAL, AND/OR DAMAGE CONTROL DIVISIONS AS DIRECTED BY THE EO. _____

K. OER/EDUCATION RECORD ENTRY OF CHAPTER 1 COMPLETION (SUPERVISOR ACTION). _____

COMPLETION RECORD OF CHAPTER 1

FUNDAMENTALS

SIGNATURE/DATE

- 1101 Shipboard Organization _____
- 1102 Mechanical Fundamentals _____
- 1103 Electrical Fundamentals _____
- 1104 Safety Fundamentals _____
- 1105 Hydraulic Fundamentals _____
- 1106 Electric Drive Propulsion Fundamentals _____
- 1107 Welding and Cutting Fundamentals _____
- 1108 Casualty Control Fundamentals _____

SYSTEMS

- 1201 Diesel Engine System (MDE, SSDG, EDG) _____
- 1202 Gas Turbine System _____
- 1203 Propulsion Shafting, Bearings, Propellers, and
Reduction Gear Systems _____
- 1204 Controllable Pitch Propeller System _____
- 1205 Steering System _____
- 1206 Diesel Engine Jacket Water System (MDE, SSDG) _____
- 1207 Seawater System _____
- 1208 Fuel Oil and Lube Oil Systems _____
- 1209 Compressed Air System (Low Pressure, High
Pressure, and Starting Air) _____
- 1210 Cathodic Protection _____
- 1211 U.S. Coast Guard Environmental Policy _____
- 1212 Ballast, Deballast, and Stripping System _____
- 1213 Bilge Drainage Systems _____
- 1214 Sewage Collection, Holding, and Transfer (CHT)
System _____
- 1215 Potable Water System _____
- 1216 Water Purification System _____
- 1217 Ship Service Boiler System _____
- 1218 Refrigeration System _____
- 1219 Air Conditioning and Chiller System _____
- 1220 Heating and Ventilation System _____
- 1221 Electrical Distribution System _____
- 1222 Interior Communications System _____
- 1223 Gyrocompass System _____
- 1224 Firemain System _____
- 1225 AFFF System _____
- 1226 Aviation JP-5 Fuel System _____
- 1227 Miscellaneous Auxiliary Equipment _____

PERFORMANCE QUALIFICATION

- 1301 Required Tasks _____

CHAPTER 2 – DAMAGE CONTROL ASSISTANT/SENIOR ENLISTED SCHOOL

Damage Control Assistant/Senior Enlisted (DCASE) School. Completion of Chapter 1 is normally a prerequisite for attending DCASE School. Officers shall not be assigned to the position of DCA without having successfully completed DCASE School. EOs with more than one Student Engineer assigned in a given year shall determine the career intentions of his/her Student Engineers and prioritize the training requests to attend based on desire to become a Naval Engineer. Student Engineers who are given low priority by their EO may be authorized waivers of Chapter 2, "DCASE School Requirements", by their Commanding Officer.

SECTION 2101 - DAMAGE CONTROL ASSISTANT / SENIOR ENLISTED (DCASE) SCHOOL

A. **DAMAGE CONTROL ASSISTANT.** Upon completion of Chapter 1, the Student Engineer shall attend Damage Control Assistant/Senior Enlisted (DCASE) School (A-4G-1111, USCG Course Code 240140). The Cutter Training and Qualification Manual, COMDTINST M3502.4, requires a prospective Engineer Officer (EO), to successfully complete DCASE School prior to assignment as EO on the following cutter classes: WAGB, WHEC, WMEC, WTGB, WMSL, WLBB, WLB, and WIX. DCASE School is also a prerequisite for holding the position of Damage Control Assistant. Completion of DCASE School shall be documented within the Student Engineer’s Officer Evaluation Report (OER) and in a Record of Professional Development, Form CG-4082.

1. Successfully completed Damage Control Assistant/Senior Enlisted course.

Date of course completion

Signature (Supervisor)

2. Enter Damage Control Management (NE-DCM) competency into officer’s Direct Access record.

Date of competency entry

Signature (Supervisor)

3. OER Entry of chapter 2 completion (Supervisor Action).

Date

Signature (Supervisor)

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CHAPTER 3 - ENGINEERING MANAGEMENT AND ADMINISTRATION AFLOAT

Engineering Management & Administration. The emphasis of Chapter 3 is to develop the knowledge and skills to serve in the capacity as an Engineering Department Division Officer and to hone EOW skills acquired in Chapter 1.

- A. The Student Engineer shall:
 1. Be assigned (at the EO's Discretion) as an Engineering Department Division Officer.
 2. Serve as a member of the EOW watch rotation.
 3. Maintain open communications with EO to align expectations and priorities and to ensure prompt performance feedback.

- B. The EO shall:
 1. Continue to supervise, instruct, and provide frequent effective feedback to the Student Engineer.
 2. Continue counseling sessions at least once per month to review the Naval Engineer PQS notebook and evaluate his/her progress.
 3. Mentor the Student Engineer and educate him/her on the career opportunities in the naval engineering program. The Naval Engineering Career portal website has great resources to assist in these efforts (<https://cgportal2.uscg.mil/communities/naval-engineering-career-info>)

SECTION 3101 – ENGINEERING DEPARTMENT MAINTENANCE MANAGEMENT

- A. Reference Material.
 1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 2. SFLC Process Guides
 3. SFLC Website (<http://cgweb.sflc.uscg.mil>)

- B. Explain the difference between a Modernized Asset and a Non-Modernized Asset.

- C. Maintenance.
 1. Explain the following types of Maintenance:
 - a. Corrective Maintenance (CM)
 - b. Preventative Maintenance
 - c. Alterative Maintenance
 - d. Planned Maintenance
 - e. Unplanned Maintenance
 2. What is Bi-Level Maintenance? Explain the two components.

- D. Preventive Maintenance System (PMS).
 1. Explain how to initiate a PMS Change Request.
 2. Explain how Maintenance Procedure Cards are developed and reviewed.
 3. Become proficient in the Maintenance Management functions of CMplus/FLS-MAM.
 4. Explain how PMS scheduling intervals are determined.
 5. State the resources available to assist cutters in the completion of PMS? What are the procedures for requesting Maintenance and Weapons Augmentation Team (MWA)?
 6. Where are MPCs for all assets maintained?

- E. Engineering Department Maintenance Management.
 1. Demonstrate the ability to manage PMS:
 - a. Provide the tools, spare parts, and consumables required by the maintenance procedure card (MPC) to complete a PMS procedure or casualty repair.
 - b. Obtain additional personnel with the skills required by the MPC and assign them to the task.
 - c. Upon completion of the maintenance action, clean up the area, stow tools and equipment, and properly dispose of any waste or used parts.
 - d. Perform an operational test of the system.

2. Inform the appropriate personnel (Commanding Officer, Executive Officer, First Lieutenant, etc.) about the proposed maintenance action and any restrictions on the system during the procedure.
 3. Make the required entries in the Engineering Log, Machinery History file, CMPlus/FLS-MAM, and Preventative Maintenance System files.
 4. Manage the Engineering Department work schedule that takes into consideration these five items:
 - e. Cutter Deployment schedule
 - f. Cutter Availability schedule
 - g. Planned Maintenance
 - h. Unplanned Maintenance
 - i. Personnel Available
- F. Casualty Repairs.
1. What is the purpose of a Casualty Report (CASREP)?
 2. What are the categories of a CASREP?
 3. What are the types of CASREP messages and when are they used?
 4. What are the mandatory fields in a CASREP message?
 5. Does a modernized asset need to release a CASREP message in CGMS? How do these units inform their operational commanders of casualties?
 6. Explain importance of proper CASREP formatting and the impact on autoloading into the FLS system. Explain importance of identifying the appropriate EIC.
 7. Who in the SFLC Product Line reviews/responds to CASREPs?
 8. What does the cutter crew need to do in FLS-MAM once a CASREP is released via the message board?
- G. Current Ships Maintenance Project (CSMP).
1. Explain how CSMPs are initiated. What criteria are used in developing a good CSMP?
 2. List the applicable reference documents used for preparing CSMPs.
 3. Explain the role and responsibility of the following for approving, scheduling, and funding CSMPs:
 - a. Cutter
 - b. Port Engineer
 - c. SFLC Availability Project Manager (APM)
 - d. SFLC Engineering Branch Systems and Equipment Section (SES)
 4. State why a CSMP may be disapproved.
 5. How are cost estimates determined for a CSMP?
 6. What are the criteria for determining whether AFC-30 or AFC-45 funds will be used on CSMPs?
 7. How are CSMPs tracked?
 8. How are CSMPs prepared for recurring work items?
 9. How does a CSMP get into FLS and why is it there?
- H. Industrial Support.
1. Explain the purpose of an Industrial Service Order (ISO).
 2. Who can submit ISO's?
 3. What happens after ISO submission?
- I. State the purpose of the following and how does it relate to maintenance/maintenance planning:
1. CMA
 2. SMP
 3. CSMP
 4. TCTOs
 5. Maintenance Readiness Review (MRR)
 6. Materiel Condition Assessment (MCA)
 7. NEPL
 8. Class Maintenance Plan (CMP)

SECTION 3102 – ENGINEERING DEPARTMENT RECORDS AND PROGRAMS

- A. Reference Material.
1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 2. Safety and Environmental Health Manual, COMDTINST M5100.47 (series)
 3. Equipment Tag-out Procedure, COMDTINST 9077.1 (series)
 4. Naval Ships Technical Manual, Chapter 074 (V3) & 555 (V1)
 5. Engineering Department Organization & Regulations Manual
 6. Manufacturers' Technical Publications, Ship's Information Books, Casualty Control Manual, Ship's Drawings
 7. Engineer Officer's Standing Orders
- B. State the purpose of the following logs/reports and which ones are legal records:
1. Bell Log/Data Log
 2. Engine Operating Record
 3. Engineer Officer's Standing Orders
 4. Machinery Log
 5. Fuel and Water Report
 6. Fueling Record
 7. Cutter Monthly Fuel Message/Report
 8. Engineer Officer's Night Order Book
 9. Heat Stress Survey
 10. Tag-out Log
 11. Damage Control (DC) Closure Log
 12. Cathodic Protection Log (Zinc Log)
 13. Hose Log
 14. Flex Joint Log
 15. Diesel Engine Maintenance Program (DEMP) Log
 16. Water Chemistry Log
 17. Light Off and Securing Schedule
 18. Cutter Engineering Report
 19. End of Patrol Summaries
 20. Boat Inspection Reports
 21. Underwater Body Inspection Report
 22. Post Availability Reports
 23. TCTO File
 24. CASREP File
 25. CSMP File
 26. LOGREQ File
 27. Machinery History Files
 28. Hull History Files
 29. Gyro Maintenance Log
 30. Marine Gas Turbine Log
 31. Gas Free Engineering Log
 32. J/W Test Log
 33. Annual Afloat Environmental Compliance Checklist
- C. State the purpose of the following:
1. Gas-Free Engineer
 2. Fire Marshal Program
 3. Hot Work Safety Program
 4. Critical Instrument Calibration Program
 5. Hazardous Material Control Program
 6. Damage Control Petty Officer Program
 7. Heat Stress Program
 8. Hearing Conservation Program

COMDTINST M3502.11C

- D. Electrical Tag-out Program.
1. Explain the duties of the Authorizing Officer, person attaching tag, person checking tag, and repair activity.
 2. When is it appropriate to use a Caution Tag? Danger Tag?
 3. When is an out-of-calibration label used?
 4. When is an out-of-commission label used?
 5. Where is the tag-out log located and who maintains custody of it on your ship for both Engineering and Operations.
 6. Explain the purpose of auditing the tag-out log.
 7. Who is authorized to clear a tag? If that person is not onboard, is anyone else authorized to clear a tag?
- E. Explain your ship's restricted maneuvering policy. Why is this important for bridge and engine room watchstanders to understand and use?

SECTION 3103 – STABILITY AND BUOYANCY FUNDAMENTALS

- A. Reference Material.
1. Naval Ships Technical Manual, chapter 079 (V1)
 2. Cutter Repair Party Manual
 3. Naval Engineering Manual, COMDTINST M9000.6 (series)
 4. Cutter Damage Control Book and Drawings
 5. Manufacturer's Technical Publications, Ship's Information Books, Casualty Control Manual, Ship's Drawings
 6. Maritime Counterdrug and Alien Migrant Interdiction Operations, COMDTINST M16247.4 (series)
- B. Define the following terms, and discuss how they effect and relate to cutter stability:
1. Displacement
 2. Volume
 3. Density
 4. Weight
 5. Buoyancy
 6. Trim
 7. Stability
 8. Moment
 9. Displacement
 10. Draft
 11. Calculative draft marks
 12. Force of buoyancy
 13. Mean draft
 14. Heel marks
 15. Freeboard
 16. Pitch
 17. Limiting draft marks
 18. List
 19. Roll period
 20. Free surface
 21. Lolling
 22. Wind
 23. Center of buoyancy
 24. Center of gravity
 25. Force
 26. Solid flooding
 27. Loose water
 28. Free surface effect
 29. Free communication effect
 30. Maximum load condition
 31. Force of gravity
 32. Navigational draft marks
 33. Reserve buoyancy
 34. Center of floatation
 35. Overall stability
 36. Righting moment
 37. Righting arm
 38. Metacenter
 39. Metacentric height (positive and negative)
 40. Danger angle
 41. Floodable length
 42. Yaw
 43. Ice build-up
 44. Minimum load condition

COMDTINST M3502.11C

- C. Describe the purpose of performing an inclining experiment.
- D. Discuss changes of trim and list and the effect on overall stability.
- E. Describe the three possible causes of list and how to correct for each.
- F. Identify the effects on transverse and/or longitudinal stability when the following are applied to liquid load and/or solid load (cargo, equipment):
 - 1. Weight additions
 - 2. Weight removals
 - 3. Weight shifts
- G. Define the following methods of correcting list and trim caused by unequal weight distributions:
 - 1. Ballasting
 - 2. Jettisoning weights
 - 3. Counter-flooding
 - 4. Lower solid weights
- H. Describe the impact of Free Surface Effect on stability and why it should be minimized.
- I. Define Critical Draft. Why is it important to know during drydocking or grounding situations?
- J. Daily Liquid Loading Report.
 - 1. Who performs the Daily Liquid Load Report?
 - 2. What is recorded on the Daily Liquid Load Report?
 - 3. Where is the information posted?
 - 4. Do the results of the Daily Liquid Load Report get entered into the cutter's Flooding Casualty Control Software (FCCS)?
 - 5. What are the key metrics that are produced by FCCS?
 - 6. What information is useful for the Commanding Officer to know on a daily basis?
- K. State the most common causes of flooding.
- L. Law Enforcement.
 - 1. What are visual signs that a vessel is unstable?
 - 2. What concerns are you going to relay to the command about a vessel that appears overloaded?
 - 3. Migrants.
 - a. What do you want the BO to know about stability and an overloaded vessel as he/she approaches the vessel?
 - b. How can he/she minimize change in stability when they get onboard?
 - c. How can he/she minimize change in stability when the migrants are transferred to the cutter?
 - d. What are the migrant loading limitations for your cutter?
 - 4. What are the stability limitations for Flight Operations (day and night)?

SECTION 3104 – TRAINING FUNDAMENTALS

- A. Reference Material.
1. Cutter Organization Manual, COMDTINST M5400.16 (series)
 2. Cutter Training and Qualification Manual, COMDTINST M3502.4 (series)
 3. Training and Education Manual, COMDTINST M1500.10 (series)
 4. Competency Dictionary
- B. Define the following types of training:
1. PQS
 2. Team Training
 3. Divisional Training
 4. Correspondence courses
 5. On-the-job training
 6. Striker program
 7. Resident Training Courses
 8. Drills
 9. Fast Cruise
 10. Standard Training Requirements (STR)
 11. Battle problems
 12. Fleet Exercises (FLTEX)
 13. Training Teams (DCTT, ETT)
 14. Basic Engineering Casualty Control Evolutions (BECCE)
 15. Command Assessment of Readiness & Training (CART)
 16. Tailored Ship's Training Availability (TSTA)
 17. Special and Emergency Operations and Procedures (SEOPS) Training
 18. Safety Mobile Assistance and Response Team (SMART)
 19. Limited Team Training (LTT)
 20. Helicopter Standardization Training (Helo STAN)
 21. Boat Standardization Training (Boat STAN)
- C. State the responsibilities of the following personnel in developing the department/division training plan:
1. Executive Officer
 2. Department Head
 3. Training Officer
 4. Division Officer
 5. CPO/LPO
 6. Safety Officer
 7. Medical Dept Rep
 8. DCA
 9. Training Team Leader
- D. What is the purpose of the Training Board? List the required members and their functions.
- E. State the purpose, content, and procedures for completing the following records:
1. Quarterly Training Plan
 2. Divisional Training Plan
 3. Watch Qualifications Record/Board
 4. Individual Training Record
 5. Individual Development Plan (IDP)
 6. Training Management Tool (TMT)
- F. Explain how the department maintains the following records of personnel qualification:
1. Watchstanding
 2. Small Boat Qualifications
 3. Advanced Damage Control

COMDTINST M3502.11C

4. Basic Damage Control
 5. First Aid
 6. Repair Locker Team Member
 7. Helicopter Firefighting & Fueling Team
- G. Explain how to properly document PQS completion (i.e. letter, Administrative Remarks, Form CG-3307, Record of Professional Development, Form CG-4082).
- H. Coast Guard Competencies.
1. What are competencies?
 2. What is the process for documenting competencies?
 3. How do you know what competencies are achieved for yourself and subordinates?
 4. Where can you find a list and definition of all competencies?
 5. What are Officer Specialty Management System (OSMS) Officer Specialty Codes (OSC)?
 6. Where can you find the requirements to obtain an OSC?
 7. List all OSC codes.

SECTION 3105 – CORRESPONDENCE FUNDAMENTALS

- A. Reference Material.
 - 1. Cutter Organization Manual, COMDTINST M5400.16 (series)
 - 2. The Coast Guard Correspondence Manual, COMDTINST M5216.4 (series)
 - 3. Standard Distribution List (SDL), COMDTNOTE 5605
 - 4. Naval Engineering Manual, COMDTINST M9000.6 (series)
 - 5. Standardized Subject Identification Codes (SSIC) Manual, COMDTINST M5210.5 (series)
 - 6. The Coast Guard Directives System, COMDTINST M5215.6 (series)
 - 7. Directives, Publications & Reports Index, COMDTNOTE 5600
 - 8. Telecommunication Manual, COMDTINST M2000.3 (series)
 - 9. U.S. Navy “Ship Work Breakdown Structure”, Document Number S9040-AA-IDX-010/SWBS
- B. State the purpose of the following types of correspondence:
 - 1. Memo
 - 2. Business Letter
 - 3. Digest
- C. Where can you find the abbreviated title and/or staff symbol for the from, to, and thru lines on a memo?
- D. Explain the different kinds of endorsements on a memo.
- E. State the purpose of the Standard Subject Identification Code (SSIC).
- F. How is signature authority delegated?
- G. What is FOUO and what limitations does this designation entail?
- H. Define the following:
 - 1. Routine
 - 2. Priority
 - 3. Immediate
 - 4. Flash
- I. What is the function of a date/time group on a message?
- J. State who has “releasing” authority aboard your cutter.
- K. Discuss “minimize” and its effects on normal traffic.
- L. Discuss the purpose and use of address indicating groups (AIG).
- M. Where can you find the list of assigned AIGs?
- N. Explain how the following correspondence is drafted. List the IT system/form used, purpose, and to whom the information goes to.
 - 1. PMS Change Request
 - 2. LOGREQ
 - 3. ORDALTS
 - 4. POLREP
 - 5. Changes to DC Book
- O. Explain the difference between a Coast Guard Instruction and a Coast Guard Manual.
- P. State the purpose of the Ship Work Breakdown Structure (SWBS) and the Extended Ship Work Breakdown Structure (ESWBS).

SECTION 3106 – PERSONNEL MANAGEMENT FUNDAMENTALS

- A. Reference Material.
1. Enlisted Accessions, Evaluations and Advancements, COMDTINST M1000.2 (series)
 2. Officer Accessions, Evaluations and Promotions, COMDTINST M1000.3 (series)
 3. Military Separations, COMDTINST M1000.4 (series)
 4. Military Assignments and Authorized Absences, COMDTINST M1000.8 (series)
 5. Coast Guard Drug and Alcohol Abuse Program, COMDTINST M1000.10 (series)
 6. Discipline and Conduct, COMDTINST M1600.2 (series)
 7. Military Civil and Dependent Affairs, COMDTINST M1700.1 (series)
 8. Military Casualties and Decedent Affairs, COMDTINST M1770.9 (series)
 9. Military Bonus Program, COMDTINST M7220.2 (series)
 10. Pregnancy in the Coast Guard, COMDTINST 1000.9 (series)
 11. Administration of Public Health Service (PHS) Officers Detailed to the Coast Guard, COMDTINST 1000.11 (series)
 12. Correcting Military Records, COMDTINST 1070.1 (series)
 13. Leave and Earnings Statement (LES)
 14. Medals and Awards Manual, COMDTINST M1650.25 (series)
 15. United States Coast Guard Regulations 1992, COMDTINS M5000.3 (series)
 16. Training and Education Manual, COMDTINST M1500.10 (series)
 17. Military Justice Manual, COMDTINST M5810.1 (series)
 18. Administrative Investigations Manual, COMDTINST M5830.1 (series)
 19. Uniform Code of Military Justice
 20. Personnel and Pay Procedures, PSCINST M1000.2 (series)
 21. Thrift Savings Plan, (www.tsp.gov)
 22. Coast Guard Weight and Body Fat Standards Program Manual, COMDTINST M1020.8 (series)
- B. Explain the Commandant's policy on:
1. Anti-Discrimination and Anti-Harassment
 2. Equal Opportunity
 3. Diversity
- C. What is the CG's policy on:
1. Indebtedness and financial responsibility
 2. Government travel card
 3. Alcohol usage
 4. Use of controlled substances
 5. Weight and body fat
- D. What are the responsibilities of a Command Master Chief (CMC)/Command Senior Chief (CSC)/Command Chief (CC)?
- E. Explain the duties of the Command OMBUDSMAN.
- F. What assistance can be obtained from the following:
1. Navy Relief Society
 2. American Red Cross
 3. Coast Guard Mutual Assistance Officer
 4. Family Service Center
 5. Civil Rights Officer
 6. Public Affairs Officer
 7. Morale Officer
 8. Employee Assistance Program
 9. Work Life Office
 10. Special Needs Program

- G. Discuss the procedure required to request the following:
1. "A" School/"C" School
 2. Officer Candidate School
 3. Become a Warrant Officer
 4. CWO to LT
 5. Tuition Assistance
 6. Post Graduate/Advanced Education (Naval Engineering (NE), Naval Engineering Technology (NET), and ACET-E/ACET-O)
- H. Discuss the sequence of events when processing the following requests:
1. Leave (Normal/Emergency/Maternity/Paternity)
 2. Standby/Exchange of duty
 3. Hardship Transfer
 4. Humanitarian Transfer
- I. Enlisted Employee Review (EER).
1. Explain the rating chain and schedule for enlisted members marks (regular, discipline, advancement, etc.).
 2. Which forms are used to mark enlisted?
 3. Is an enlisted employee review support form required?
 4. What happens when the "Effective Date" is changed in the EER in Direct Access?
 5. What marks require reviewer comments?
 6. How many days do you have to counsel a member on their EER after the end of the employee review period?
 7. How many days does an enlisted member have to appeal his/her marks?
 8. What is the appeal process?
- J. Officer Evaluation Reports (OER).
1. Explain the rating chain and submission schedule for OERs.
 2. Which forms are used to mark officers?
 3. What are your officer support form (OSF) responsibilities?
 4. What are the Supervisor's responsibilities?
 5. What are the Reporting Officer's responsibilities?
 6. What are the Reviewer's responsibilities?
 7. Explain the use of exception OERs.
 8. When are reviewer comments required?
 9. What is the maximum mark authorized in the Health and Well-being category for an individual who receives and Alcohol Incident, Drug Incident, or is not compliant with the Coast Guard weight and body fat standards?
- K. What information do Promotion Boards and Selection Panels consider for Officers?
- L. How do you request a review of your official record and receive career counseling from OPM-4?
- M. Assignment Year Information.
1. Explain how to fill out an e-resume.
 2. When do you need command endorsement on an e-resume?
- N. Awards.
1. State the process for recommending an individual for an award.
 2. Who are members of the Awards Board?
 3. Explain the awarding authority for personal awards?
 4. Explain how to draft a positive page 7. Is it part of the member's official record?
- O. Discipline.
1. What is a Report of Offense and Disposition, Form CG-4910?
 2. What are the responsibilities of a Preliminary Inquiry Officer (PIO)?

COMDTINST M3502.11C

3. What are the responsibilities of a Mast Representative?
 4. Explain maximum punishment at NJP for Officers and Enlisted.
 5. Explain how to draft a negative page 7. Is it part of the member's official record?
- P. Unsatisfactory Performers.
1. How long do you have to observe someone's performance before placing them on performance probation?
 2. What is the process for placing someone on performance probation?
 3. How long does an individual have to correct their performance prior to be considered for discharge?
- Q. Define the Selected Reenlistment Bonus (SRB) system.
- R. Discuss the information contained in a Leave and Earnings Statement (LES).
- S. Explain the TSP Program.
- T. Explain the following three retirement programs:
1. CG members who joined on or before 07SEP1980 (final pay)
 2. CG members who joined between 08SEP1980 and 01AUG1986 and members who joined after 01AUG1986 who did not receive the Career Status Bonus (high-three)
 3. CG members who joined after 01AUG1986 and received the Career Status Bonus (REDUX)
- U. What is the importance of retirement counseling at the 15 year mark?

SECTION 3107 – LOGISTICS AND FINANCIAL MANAGEMENT FUNDAMENTALS**A. Reference Material.**

1. Supply Policy and Procedures Manual (SPPM), COMDTINST M4400.19 (series)
2. Naval Engineering Manual, COMDTINST M9000.6 (series)
3. Casualty Reporting (CASREP) Procedures (MATERIEL) Manual, COMDTINST M3501.3 (series)
4. SFLC Process Guides
5. Simplified Acquisition Procedures (SAP) Manual, COMDTINST M4200.13 (series)
6. U.S. Coast Guard Property Management Manual, COMDTINST M4500.5 (series)
7. Afloat Supply Procedures Manual, NAVSUP PUB 485 (V1)

B. Define the following and explain their purpose:

1. Equipment
2. Equipage
3. Repair parts
4. Consumables
5. Integrated Logistics Support (ILS)
6. Integrated Logistics Support Plan (ILSP)
7. Integrated Logistics Support Management Team (ILSMT)
8. Vessel Logistics System (VLS)
9. Fleet Logistics System (FLS)
10. Logistics Compliance Inspection (LCI)
11. CMplus/FLS-Mobile Asset Manager (MAM)
12. Naval & Electronics Supply Support System (NESSS)
13. Logistics Information Management System (LIMS)
14. Asset Logistics Management Information System (ALMIS)
15. Asset Computerized Maintenance System (ACMS)
16. Electronic Asset Logbook (EAL)
17. Aviation Maintenance Management Information System (AMMIS)
18. Coast Guard Parts Availability Research Tool (CG-PART)
19. Mandatory turn-in items (MTI)
20. Depot Level Maintenance
21. Organizational Level Maintenance
22. Requisition and Invoice/Shipping Document, DD Form 1149
23. Operating Materiel and Supplies (OM&S)
24. Selective Item Management (SIM)
25. Military Standard Requisitioning and Issue Procedures (MILSTRIP)
26. GSA Schedule
27. National Stock Number (NSN)
28. National Item Identification Number (NIIN)
29. Allowance Part List (APL)
30. Combined Parts List (CPL)
31. Allowance Equip List (AEL)
32. Manufacture's Cage number
33. Manufacture's Part Number
34. General Purpose Property
35. Configuration Change Form (OPNAV 4790/CK)
36. Configuration Change Proposals
37. Warranty Notice
38. Government Furnished Equipment/Material (GFM)
39. Inventory Control and Compliance Program (ICCP)
40. Defense Reutilization and Marketing Office (DRMO)
41. Naval Engineering Technical Information Management System (NE-TIMS)
42. Supply Discrepancy (SDR)/Quality Deficiency (QDR)
43. Coordinated Shipboard Allowance List (COSAL)

COMDTINST M3502.11C

- C. What is the purpose and functional parts of the Vessel Logistics System (VLS)?
- D. What is the purpose and functional parts of the Logistics Information Management System (LIMS)?
- E. Explain the importance of Configuration Management and the effects of a configuration change on:
 - 1. Storeroom Inventory
 - 2. Equipment Maintenance
 - 3. Technical Documentation
 - 4. Casualty Response
 - 5. TCTO Planning
 - 6. CMplus/FLS
- F. Discuss the consequences of uncontrolled or undocumented configuration changes.
- G. Discuss the functions of CMplus/FLS-MAM.
- H. Describe unit procedures for the receipt and storage of supplies during both working and non-working hours.
- I. Explain the policy of the Uniform Material Movement and Issue Priority System (UMMIPS).
- J. Discuss using the GSA supply schedule.
- K. State the purpose and content of all the supply forms used for ordering parts/services.
- L. State the step-by-step procedures for ordering and procuring material through the ship's supply organization.
- M. Discuss the type, method, and procedure for tracking outstanding requisitions in material procurement.
- N. State the conditions under which material can be surveyed and initiate a survey.
- O. Define the QDR/SDR process and use of SFLLC website for report submission.
- P. State the importance and procedures in handling DLR/MTI items, and the financial consequences to your unit for failure to return these items.
- Q. Discuss the methods a Division Officer can utilize to improve the material management effectiveness within his/her shipboard supply organization.
- R. Explain the difference in the requirements when ordering an item that costs less than \$100 and one that costs over \$2500.
- S. Explain the difference between AFC-30 and AFC-45 funds.
- T. What does Min/Major (MM) mean in regards to AFC-30 funds?
- U. What is the CASREP threshold for your cutter?
- V. Explain how to use APL/CPL/AEL and CMPs as requisitioning guides.

SECTION 3201 – REQUIRED TASKS

SIGNATURE/DATE

A. ENGINEERING DEPARTMENT MAINTENANCE MANAGEMENT

- 1. Coordinate and monitor Industrial and MAT/WAT work orders.
 - a. Define Scope of Work
 - b. Prepare Cost Estimate
- 2. Schedule and execute a cutter preventative maintenance activity.
- 3. Develop an Engineering Department work schedule which considers cutter schedule and planned maintenance.
- 4. Prepare and submit the following:
 - a. CASREP/CASREP UPDATE/CASCOR
 - b. CSMP
 - c. CMPlus/FLS-MAM SMP
 - d. ISO
 - e. Edits to NEPL
 - f. TCTO
 - (1) Equipment Addition
 - (2) Equipment Modification
 - (3) Equipment Removal
 - (4) Equipment Relocation

B. ENGINEERING DEPARTMENT RECORDS AND PROGRAMS.

- 1. Prepare and submit the following:
 - a. Cutter Engineering Report
 - b. Cutter Monthly Fuel Report/Message
 - c. Deployment Summary
 - d. Boat Inspection Report
 - e. Full Power Trial Results
 - f. Annual Afloat Environmental Compliance Checklist
- 2. Review, update, and maintain the following files:
 - a. Damage Control Closure Log
 - b. Diesel Engine Maintenance Program
 - c. Machinery History File
 - d. Hull History File (Assist 1st LT)
 - e. PMS Completion Status
 - f. CASREP File
 - g. TCTO Files
 - h. CSMP Files
 - i. Lube Oil Analysis
 - j. Machinery Log
 - k. Daily Fuel, Oil, and Water Report
 - l. Tag-out Log (Assist EMC)
- 3. Audit the Tag-out Log.
- 4. Document Gas Free and Hot Work evolutions.
- 5. Draft a MISHAP Report.

C. STABILITY AND BUOYANCY

- 1. Provide the Commanding Officer with daily Liquid Load status.

2. Become familiar with the Cutter Stability and Loading Data Booklet or the DC Book.
3. Demonstrate proficiency in executing the procedures of the Fuel Transfer and Ballast Bill and the Stability and Liquid Loading instructions of your cutter.
4. Demonstrate correcting and restoring the cutter to correct trim and list.
5. Calculate your cutter's Metacentric Height (GM) in all conditions.
6. Determine Critical Draft when going into Drydock.

D. TRAINING

1. Submit an ETR for a crew member.
2. Develop, implement, and monitor the effectiveness of the Engineering Department and Unit Damage Control Weekly and Quarterly Training (drills, instruction) Plan.
3. Qualify as a member of the Damage Control Training Team (DCTT) and the Engineering Casualty Control Training Team (ETT).
4. Monitor qualification and ensure that Engineering Watchstanders and Repair Locker personnel are qualified in their assigned positions.
5. Maintain Department Training Records (Formal Schools, PQS, JQR, OJT).

E. CORRESPONDENCE

1. Properly draft the following forms of correspondence:
 - a. Memo
 - b. Business Letter
 - c. PMS Change Request
 - d. POLREP

F. PERSONNEL MANAGEMENT

1. Evaluate Division Personnel; Enlisted Employee Review (EER).
2. Document adverse and commendable Achievements on Administrative Remarks, Form CG-3307.
3. Draft and submit a sample OER.
4. Draft and submit an award nomination for a Crewmember.
5. Conduct an investigation as a PIO.
6. Participate in a mentoring session.

G. LOGISTICS & FINANCIAL MANAGEMENT

1. Draft a procurement request for the following amounts:
 1. Under \$250
 2. \$1 to \$2,499
 3. \$2,500 to \$25,000

- 4. Over \$25,000 _____
- 5. Sole Source Justification _____
- 2. Prepare and forward the following:
 - 1. Shipboard Parts Requisition (NAVSUP 1250-1) _____
 - 2. Allowance Change Request (NAVSUP 1220-2) _____
 - 3. Report of Discrepancy (ROD), SF-364 _____
 - 4. Stock Record Card (1114m) _____
 - 5. Quality Deficiency Report (QDR) _____
 - 6. Supply Discrepancy Report (SDR) _____
 - 7. Requisition and Invoice/Shipping Document, DD-1149 _____
 - 8. DOD Single Line Item Requisition System Document, DD-1348 _____
- 3. Draft a Divisional Budget and Spending Plan. _____

COMPLETION RECORD OF CHAPTER 3

FUNDAMENTALS

SIGNATURE/DATE

3101 Engineering Department Maintenance Management	_____
3102 Engineering Department Records and Programs	_____
3103 Stability and Buoyancy Fundamentals	_____
3104 Training Fundamentals	_____
3105 Correspondence Fundamentals	_____
3106 Personnel Management Fundamentals	_____
3106 Logistics and Financial Management Fundamentals	_____

PERFORMANCE QUALIFICATION

3201 Required Tasks _____

ENTER COMPETENCIES ACHIEVED FOR COMPLETION OF STUDENT ENGINEER PROGRAM. COMPETENCIES FOR CHAPTERS 1, 2, AND 3 ARE: ENG-SH1, NE-AE, NE-AT, AND NE-DMM.

Competencies entered _____

OER ENTRY OF CHAPTER 3 COMPLETION (SUPERVISOR ACTION)

OER entry completed _____

OPTIONAL: Shipboard experience during the Student Engineer’s initial afloat tour as Division Officer and EOW are transferable to Merchant Marine Licensing. Further details are shown in Chapter 2 of the Marine Safety Manual, Volume III, Marine Industry Personnel, COMDTINST M16000.8 (series). The application process takes several months but it has the potential to open some doors in the future. Now is a prime time to think about applying for an appropriate Merchant Marine License.

CHAPTER 4 – DECK WATCH OFFICER

Deck Watch Officer (DWO) Training. Procedures for completing Chapter 4 are outlined in Chapter 7 of the Cutter Training and Qualification Manual, COMDTINST M3502.4 (series).

SECTION 4101 - DECK WATCH OFFICER (DWO) TRAINING

A. Chapter 7 of Cutter Training and Qualification Manual, COMDTINST M3502.4 (series), provides guidance for completing DWO Options 1 and 2.

1. Completed Option 1

Date of Completion

Signature (Supervisor)

2. Completed Option 2

Date of Completion

Signature (Supervisor)

3. Enter appropriate competency (for cutter class) achieved for OOD qualification if Option 2 was completed.

Date of Completion

Signature (Supervisor)

4. OER Entry of Chapter 4 completion (Supervisor Action)

Date of Completion

Signature (Supervisor)

NOTE: While completion of Option 2 is not required to be assigned as an EO, it is strongly encouraged. Option 2 completion earns you a full underway OOD qualification and enables you to be listed in a cutter’s Succession to Command. If you have not completed Option 2 as a Student Engineer, it will be much harder to earn it on a subsequent afloat tour. Earning and maintaining a full OOD qualification enhances an officer's competitiveness for future promotion and assignment opportunities, including CO/XO afloat. If you are considering a subsequent LTJG afloat tour as CO, XO, Navy Exchange, or Weapon’s Officer, completion of Option 2 is a prerequisite and shall be documented in your official record. It is strongly encouraged to renew your qualification at each afloat unit you are assigned.

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PART II

NAVAL ENGINEER IN TRAINING

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CHAPTER 5 - NAVAL ENGINEERING ORGANIZATION & MAINTENANCE MANAGEMENT

Chapter 5 may be addressed during the initial afloat tour but shall be completed during a subsequent Naval Engineering tour. The EO or Supervisor/Reporting Officer shall properly document the completion in the Officer's OER.

SECTION 5101 – NAVAL ENGINEERING SUPPORT ORGANIZATIONAL STRUCTURE

- A. Reference Material.
1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 2. SFLC Process Guides
 3. Financial Resource Management Manual (FRMM), COMDTINST M7100.3 (series)
 4. Major Systems Acquisition Manual (MSAM), COMDTINST M5000.10 (series)
 5. Shipboard-Helicopter Operational Procedures Manual, COMDTINST M3710.2 (series)
 6. Commandant (CG-45) Website (<https://cgportal2.uscg.mil/units/cg45>)
 7. SFLC Website (<http://cgweb.sflc.uscg.mil/>)
- B. Headquarters Naval Engineering Division Commandant (CG-45).
1. What is the function and primary responsibility of the following Commandant (CG-45) Divisions:
 - a. CG-451, System Management Division
 - b. CG-452, Resources Division
 - c. CG-459, Ship Design Team
 2. Resource Proposals (RP) and the role RPs play in the annual Coast Guard budget Request Process.
 - a. Who initiates Resource Proposals (RPs) for Naval Engineering?
 - b. Define the following funds: How are RPs submitted for each? Does Commandant (CG-45) control the fund? If not, what HQ division does? How are funds allocated to SFLC, Districts, and CG Yard?
 - (1) OE: AFC-30, AFC-45, AFC-77
 - (2) AC&I
 - (3) EC&R
 - (4) RDT&E
 - (5) Yard Fund
 3. List the policy documents managed by Commandant (CG-45).
- C. What are the primary functions and responsibilities of the following Product Lines and Divisions at Surface Forces Logistics Center (SFLC)?
1. Long Range Enforcer Product Line (SFLC-LRE)
 2. Medium Endurance Cutter Product Line (SFLC-MEC)
 3. Patrol Boat Product Line (SFLC-PBPL)
 4. Ice Breaker / Buoy and Construction Tender Product Line (SFLC-IBCT)
 5. Small Boat Product Line (SFLC-SBPL)
 6. Contracting and Procurement Division (SFLC-CPD)
 7. Asset Logistics Division (SFLC-ALD)
 8. Engineering Services Division (SFLC-ESD)
 9. Industrial Operations Division (SFLC-IOD)
 10. Business Operations Division (SFLC-BOD)
 11. Workforce Services Division (SFLC-WSD)
- D. Coast Guard Yard.
1. What is the function and primary responsibility of the following:
 - a. Industrial and Shipyard Support
 - (1) Project Management Division
 - (2) Engineering and Business Management Division

COMDTINST M3502.11C

- (3) Planning & Estimating Division
 - (4) Project Management Division
 - (5) Structural Shop
 - (6) Mechanical Shop
 - (7) Electro Shop
 - (8) Services Shop
 - b. Yard Safety Office
 - c. Facilities Management
 - d. Fiscal Department
 - e. Servicing Personnel Office
 - f. Quality Department
2. What magnitude of ship repair and construction is the CG Yard capable of undertaking? Explain the shipyard facilities.
 3. Explain how the CG Yard can be awarded work without having to compete with commercial repair facilities.
- E. Base Naval Engineering Department.
1. What are the primary functions and responsibilities of a Base Naval Engineering Department Head?
 2. Explain how a cutter, Base Naval Engineering Department, and SFLC interface.
 3. What type and to what extent do Base Naval Engineering Departments provide maintenance and logistic support to Area, District, and Sector cutters and boats?
 4. State the primary function of a Maintenance and Weapons Augmentation Team (MWA). What is the process for requesting and coordinating MWA assistance for units?
 5. What is the primary function of a Coast Guard Industrial Production Facilities?
 - a. How are Work Orders processed?
 - b. Who funds Industrial work?
 6. Define the following authorities and tell where their definitions can be found:
 - a. Technical Authority
 - b. Command Authority
 7. What is the National Industrial Enterprise?
 - a. How many Industrial Production Facilities (IPFs) are there in the Coast Guard?
 - b. How many Industrial Production Detachments (IPDs) are there in the Coast Guard?
 - c. How do IPFs and IPDs provide mission support services to the following:
 - (1) SFLC Technical Authority
 - (2) Shore Infrastructure Logistics Center (SILC) Technical Authority
 - (3) C4IT Service Center Technical Authority
 - (4) Operational Commander
 - (5) CG-93, Director of Acquisition Programs
 8. How do IPFs and IPDs support the Deputy Commandant for Mission Support's Contingency Response Plans? What specialized response team do Naval Engineering Departments deliver in the event of a disaster?
 9. How does the Director of Logistics (DOL) oversee and influence Base Naval Engineering Departments?
 10. What is contained in the Base Naval Engineering Process Desk Guides? Where can you find them?
- F. What is the function and primary responsibility of other CG Headquarters Directorates (Commandants (CG-7), (CG-8), (CG-9), DCMS-81, DCMS-DOL)?
1. CG-93, Director of Acquisition Programs
 2. CG-932, Surface Acquisition Programs
 3. CG-751, Cutter Forces
 4. CG-731, Boat Forces
 5. CG-82, Office of Budget and Programs
 6. CG-83, Office of Resource Management
 7. DCMS-81, Office of Workforce Management
 8. DCMS-DOL-3, Office of Base Operations

SECTION 5102 – ASSET MAINTENANCE MANAGEMENT

- A. Reference Material.
1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 2. Casualty Reporting (CASREP) Policy (Material) Manual, COMDTINST 3501.3 (series)
 3. SFLC Process Guides
 4. SFLC Website (<http://cgweb.sflc.uscg.mil>)
- B. SFLC Product Line Engineering and Projects Branch.
1. Explain the roles and responsibilities within the Asset Management Section.
 2. Explain the roles and responsibilities within the Systems Engineering Section.
 3. Explain the shared services provided to the Product Line Engineering and Projects Branch.
 4. Explain the interaction of Engineering and PDM branches to support maintenance execution.
- C. Hierarchy of Guidance.
1. Explain hierarchy of guidance for maintenance standards.
 2. What are SFLC Technical Standards?
 3. What is the Class Maintenance Plan? How does it govern maintenance scheduling and funding?
- D. Casualty Reports (CASREP).
1. Define CASREP.
 2. When are cutters required to submit a CASREP?
 3. When are cutters required to cancel a CASREP vice just cancel a message?
 4. Explain CASREP categories. Explain when cutters should upgrade and downgrade codes.
 5. Explain operational impact as it relates to CASREPs. Why is this important?
 6. Explain the importance of Configuration Items as related to CASREPs.
 7. Explain the importance of CASREP formatting as related to support.
 8. How do vessels enrolled in EAL and ACMS report casualties to systems or equipment? Do they need to release a CASREP message in CGMS?
 - a. Define a Discrepancy. How is it processed?
 - b. Define a Carry Forward Depot (CFD). How is it processed?
 9. Explain the role and responsibility of the following commands and units in reporting, funding, and responding to CASREPs:
 - a. Cutter
 - b. Operational Commander, Program Manager
 - c. SFLC Product Line
 - d. Base Naval Engineering Departments
 - e. Base C4IT Department
- E. Time Compliance Technical Orders (TCTO).
1. What is a TCTO?
 2. TCTOs are required for what types of configuration change proposals?
 3. How are TCTOs initiated? Who initiates TCTOs?
 4. What criteria are TCTOs evaluated for?
 5. Explain the key components of the following phases:
 - a. Concept Phase
 - b. Validation Phase
 - c. Development Phase
 - d. Deployment Phase
 6. If there is no funding available, where does the TCTO process stall?
 7. What is SFLC ESD's role in the TCTO process?
 8. What is the responsibility of the Surface Forces Configuration Control Board (SFCCB)?
 9. Who are members of the SFCCB?
 10. What is a Tri-P? What are the main components of the group?
 11. Who has final authorization on TCTO approval and implantation?

COMDTINST M3502.11C

12. Explain the purpose of initiating a TCTO prototype. Are TCTO prototypes always required? Who is authorized to initiate a TCTO Prototype?
 13. How are TCTOs tracked for Non-Modernized units? Modernized units?
 14. What is a message TCTO and why are they used?
 15. Explain the routing chain for message TCTOs?
- F. Discuss the policy and procedures for testing the following weight handling equipment:
1. Davits
 2. Ammo & Commissary Hoists
 3. Cranes
 4. Cross Deck Winches
 5. Flight Deck Tie-Down Fittings & Flight Deck Nets
 6. J-Bar davits
 7. Pad-eyes
- G. Cutter Engineering Report (CER).
1. Define the CER requirements for a Non-modernized unit.
 2. Define the CER requirements for a Modernized unit.
- H. Ship Structure and Machinery Evaluation Board (SSMEB).
1. What is the purpose of an SSMEB?
 2. What is the evaluation interval of an SSMEB?
 3. Who funds SSMEBs?
 4. Who comprises the SSMEB?
 5. What forms make up the SSMEB report? Give a brief purpose explanation for each form.
- I. Engineering Analysis Board (EAB)
1. What is the purpose of an EAB?
 2. Who appoints an EAB?

SECTION 5103 – PROGRAM DEPOT MAINTENANCE MANAGEMENT

- A. Reference Material.
 - 1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 - 2. SFLC Process Guides
 - 3. Naval Ships Technical Manual, Chapter 997
- B. SFLC Product Line Program Depot Maintenance Branch.
 - 1. Explain the roles and responsibilities within the Availability Project Management Section.
 - 2. Explain the roles and responsibilities of a Port Engineer.
 - 3. Explain the shared services provided to the Program Depot Maintenance Branch.
- C. Base Naval Engineering Department.
 - 1. What is the composition of the Base Naval Engineering Department workforce?
 - 2. What level of maintenance does Base Naval Engineering Department members perform?
 - 3. How do you request work from a Base Naval Engineering Department?
 - 4. How is the work funded?
- D. General.
 - 1. Define Repair Availability. What is the difference between a Repair Availability and a Charlie Period? What is the difference between a dockside (DS), dockside cutter (DSC), and drydock (DD) availability?
 - 2. Explain the difference between service, ship repair, and procurement contracts.
 - 3. List the governing documents and explain the process in which the Operational Commander and SFLC schedule Repair Availabilities (DD and DS).
 - 4. Where can you determine homeport environmental compliance requirements for homeport DS or DSC?
- E. Availability Planning Schedule. The generation of a complete contract package for a commercial availability, or a work order package for availability at a base, requires the timely execution of many separate tasks.
 - 1. What is a Material Condition Assessment (MCA)? When are MCA's conducted?
 - 2. How do MCAs impact the development of the following:
 - a. CSMPs/Carry Forward Depot (CFD)
 - b. Naval Engineering Project Listing (NEPL)
 - c. Availability Worklist Specifications
 - d. Class Maintenance Plans/Maintenance Requirements List (MRL)
 - e. TCTO deployment schedules
 - 3. When are Acquisition Teams required to convene?
 - a. List the members of the A-Team and their respective responsibilities.
 - b. What is the goal of a first A-Team meeting?
 - c. What is the goal of a second A-Team meeting?
 - d. What is the goal of the Arrival Conference meeting?
 - e. What is the goal of a third A-Team meeting?
 - 4. Who is responsible for generating the availability worklist?
 - 5. How are the availability milestones determined?
 - a. How does the unit know the timeline for submittals?
 - b. When are CSMP/CFDs identified?
 - c. Why is there a deadline for submission?
 - 6. Although full and open competition is the desired approach for soliciting contracts, explain the procedures and requirements for geographically restricting cutter availabilities.
 - a. When shall requests for geographic restrictions be submitted?
 - b. Who requests geographic restrictions?
 - c. Who grants the restrictions?
 - 7. Who determines which work items will require AFC-30, AFC-42, or AFC-45 funding? What criteria are used?
 - 8. To ensure that AFC-30 work items are included in the availability package, when are units or program managers required to transfer AFC-30 funds to SFLC? What is the method of transferring funds to SFLC?

9. If the awarded bid price for an AFC-30 item exceeds the government estimate or if there is growth during the completion of those items, who is responsible for paying the difference?
 10. Identify the responsibilities of the following parties in the review, preparation, draft, and generation of a final specification package and government estimate:
 - a. Unit/Sector
 - b. Port Engineer
 - c. Base C4IT Department Representative
 - d. SFLC PDM, ENG, SES
 - e. A-Team
 11. What events take place, and who is responsible for conducting the following:
 - a. Legal review of the specification package
 - b. Solicitation
 - c. Issuing IFB/RFP
 - d. Bid opening and evaluation
 - e. Pre-award survey
 - f. Contract award
 12. What information are you allowed to provide a bidding contractor during a Bidder's Inspection? Who responds to contractor (or potential contractor) requests for information or clarification?
- F. Conducting the Availability.
1. What are the responsibilities of the following positions during an availability?
 - a. Commanding Officer or Officer-in-Charge
 - b. Contractor
 - c. Contracting Officer (KO)
 - d. Contracting Specialist (KS)
 - e. Port Engineer
 - f. Contracting Officer's Representative (COR)
 - g. SFLC Product Line APM
 - h. Engineer Officer
 - i. Damage Control Assistant
 - j. Primary Inspector
 - k. Dockmaster
 - l. Ship's Superintendent
 2. Who is responsible for ordering and procuring AFC-30 Government Furnished Property (GFP) and AFC-45 GFP? Who is responsible for ensuring that the GFP is received, inventoried, and made available for contract start?
 3. Explain the requirements for off-loading fuel and ammunition prior to an availability.
 4. What is the purpose of conducting Pre-Availability Safety and Inspector Training?
 - a. Who is responsible for scheduling the training?
 - b. Who shall attend?
 - c. What is the intended outcome?
 5. Who is responsible for inspecting drydocking blocks to ensure proper arrangement?
 6. When shall the Underwater Body Inspection Board convene? Who convenes the board? Who are the members of the board?
 7. What is the responsibility of a Contractor regarding fire prevention, watertight integrity, storm damage, and personnel safety while in drydock and during undocking. What is the responsibility of the Commanding Officer?
 8. Explain and define the process for updating and revising the Docking Plan and ship drawings whose contents have been affected by work during maintenance availabilities.
 9. For the following events explain the purpose, individual/group responsible for scheduling, person(s) who are required to attend, and how often does it take place:
 - a. Arrival Conference
 - b. Progress Meetings
 - c. Contract Specification Clarification
 - d. Drydocking Conference
 10. State the Coast Guard's (Federal Government) position/policy regarding:

- a. Ship's force work during an availability
 - b. Employment of cutter personnel by contractors
 - c. Gratuities
 - d. Labor relations
11. State the purpose for maintaining the following records and who is responsible for initiating these reports:
 - a. Progress Chart/Reports
 - b. Inspector's Daily Work Log
 - c. Condition Found Reports
 - d. Completion Report (Status Reports)
 12. When and by whose authority can the Coast Guard stop work?
 13. What are the requirements for signing for completed work? Who has sole authority for accepting completed work?
 14. State the policy and process (required forms) for initiating, negotiating, and awarding the following contract changes/modifications. Who is authorized to make contract changes? What role does the Cutter's Program Manager, SFLC, Operational Commander, and unit have in making such a decision?
 - a. Indefinite Items
 - b. Growth Work
 - c. New Work
 15. Can new work be awarded within the context of an original contract? How can a Contracting Officer justify new work without re-advertising for full and open competition?
 16. Who is responsible for injuries to contracting personnel that take place on a Coast Guard cutter during availability?
 17. Is the Coast Guard required to ensure that a Commercial Contractor is complying with local, state, and federal safety and environmental regulations? If so, what leverage does the Coast Guard have in enforcing compliance?
 18. State the purpose and circumstances predicating the use of each of the following:
 - a. Contractor Deficiency Report (CDR)
 - b. Letter of Concern
 - c. Cure Notice
 - d. Termination of Default (T for D)
 - e. Termination for Cause (T for C)
 19. State the purpose for submitting the following correspondence (legal records and reports) and what are the submission deadlines:
 - a. Departure Message
 - b. Final written Completion Report
 - c. Contractor Performance Assessment Report (CPARs)
 - d. Post Availability Report

SECTION 5201 – REQUIRED TASKS

SIGNATURE/DATE

A. NAVAL ENGINEERING SUPPORT ORGANIZATION

Draw a block diagram of the Naval Engineering support structure from the cutter to Commandant (CG-45).

B. ASSET MAINTENANCE MANAGEMENT

1. Submit a MILSTRIP, a PR, and an ISO in FLS.
2. Make appropriate entries in EAL for worklist items and make recommendations for their proper completion (i.e. CFD, Service Request, or unit level completion).
3. Review ALMIS discrepancies for a particular unit.
4. Review unit NEPL. Schedule completion of tasks in FLS.
5. Review a TCTO Phase 1 Form and provide recommendations on approval/disapproval.
6. Review a development TCTO.
7. Review TCTO prototype evaluation feedback.
8. Verify status of Non-Modernized TCTO in SFLC Central and FLS.
9. Verify status of a Modernized TCTO in ACMS.

C. PROGRAM DEPOT MAINTENANCE MANAGEMENT

Coordinate and manage a repair availability Contract from the development of the Work List through the completion of the Third A-Team Meeting.

1. Participate in Maintenance Readiness Review (MRR).
2. Develop a Repair Availability Work List
3. Order and track GFP.
4. Attend and participate as a member of the First A-Team Meeting.
5. Assist in the development of a contract specification package.
6. Attend and participate as a member of the Second A-Team Meeting.
7. Assist in or conduct a Pre Award Survey and prepare the Pre Award Repot.
8. Receive, inspect, and validate GFP.
9. Prior to docking a cutter, review the docking plan, load calculations, and verify block location and construction.
10. Attend and participate in the Arrival Conference.
11. Participate on a Underwater Body Inspection Board.
12. Chair weekly Progress Conferences.
 - a. Review Progress Reports
 - b. Review Inspector Reports
 - c. Change Orders for Optional Items, Growth Work, and New Work
 - d. Prepare a cost estimate

- e. Review and process a change request _____
- f. Draft Contractor Deficiency Report _____
- 13. Review and process Condition Found Reports. _____
- 14. Draft and process contractor performance feedback report. _____
- 15. Attend and participate as a member of the Third A-Team Meeting. _____
- 16. Submit specification feedback. _____

D. CONTRACTING OFFICER'S REPRESENTATIVE (COR)

Complete all course requirements and apply for COR certification through FAITAS. _____

Information and links on obtaining COR can be found on Naval Engineering Career Portal site:
<https://cgportal2.uscg.mil/communities/naval-engineering-career-info>.

COMPLETION RECORD OF CHAPTER 5

FUNDAMENTALS

SIGNATURE/DATE

5101 Naval Engineering Support Organizational Structure
5102 Asset Maintenance Management
5103 Program Depot Maintenance

PERFORMANCE QUALIFICATION

5201 Required Tasks

**OER ENTRY OF CHAPTER 5 COMPLETION
(SUPERVISOR ACTION)**

OER entry completed

CHAPTER 6 - PROGRAM MANAGEMENT AND MISSION SUPPORT FUNDAMENTALS

Program Management and Mission Support Fundamentals. Chapter 6 shall be completed during a subsequent Naval Engineering tour (i.e. staff tour at HQ, SFLC, CG Yard, etc.). Supervisor/Reporting Officer shall properly document completion of this Chapter in the Officer's OER.

SECTION 6101 – PROGRAM MANAGEMENT FUNDAMENTALS

- A. Reference Material.
1. Naval Engineering Manual, COMDTINST M9000.6 (series)
 2. Major Systems Acquisition Manual, COMDTINST M5000.10 (series)
 3. Non-Major Acquisition Process (NMAP) Manual, COMDTINST M500.11 (series)
 4. Practical Guide to Contracting (CG-91)
 5. Requirements Generation and Management Process Pub 7-7
 6. DCMS Mission Support Handbook
- B. Overview of Coast Guard Acquisition and Procurement Processes.
1. What is the function and primary responsibility of the following positions and organizations:
 - a. Coast Guard Acquisition Executive (CGAE)
 - b. Coast Guard Acquisition Review Board (CGARB)
 - c. CG Acquisition Directorate (CG-9)
 - d. Project Manager (PM)
 - e. Program Manager (PgM)
 - f. Program Executive Officer (PEO)
 - g. Integrated Logistics Support Manager (ILS)
 - h. Integrated Logistics Support Management Team (ILSMT)
 - i. Contracting Officer (KO)
 - j. Contracting Officer Representative (COR)
 - k. Project Resident Office (PRO)
 - l. Asset Project Office (APO)
 - m. Coast Guard Technical Authorities
 - n. Assistant Commandant for Human Resources Directorate (CG-1)
 - o. Assistant Commandant for Intelligence & Criminal Investigations (CG-2)
 - p. Assistant Commandant for Engineering and Logistics (CG-4)
 - q. Assistant Commandant for Command, Control, Communications, Computers, and Information Technology Systems (CG-6)
 - r. Assistant Commandant for Resources (CG-8)
 2. Describe the relationships between the Program/Project Manager, the Technical Authority chain, and the Program Sponsor.
 3. Define the Coast Guard's Major Systems Acquisition Process include Acquisition Lifecycle Framework.
 4. Explain the objective and activities of the Planning, Programming, Budgeting, and Execution process.
 5. Define the following terms Coast Guard Acquisition terms:
 - a. Mission Needs Statement (MNS)
 - b. Concept Of Operations (CONOPS)
 - c. Preliminary Operational Requirements Document (PORD)
 - d. Operational Requirements Document (ORD)
 6. Explain the following Coast Guard Major Systems Acquisition five distinct phases and what Headquarters directorates are involved:
 - a. Project Identification Phase
 - b. Need Phase
 - c. Analyze/Select Phase
 - d. Obtain Phase
 - e. Produce/Deploy/Support Phase
 7. Define the Coast Guard's Non-Major Acquisition Process and phases?

8. Explain the difference between Major Systems Acquisitions and Non-Major Acquisition processes.
9. Define Life Cycle Cost Estimate (LCCE) is and why it's important to the acquisition project.
10. What are the four major cost categories of a LCCE?
11. What is the purpose of System Engineering?
12. Explain why project teams need to apply System Engineering early and continuously throughout acquisitions projects.
13. How does System Engineering apply to legacy cutters and new acquisition projects?
14. Describe the relationship between the Project and Program Managers and CG-926 Research, Development, Test and Evaluation.
15. Define Requirements Management.
16. Describe the eleven elements of Requirements Life Cycle. Recommend using the Requirements Generation and Management Process Publication 7-7.
17. What causes Requirements Turbulence?
18. Explain Life Cycle Cost and Total Ownership Cost and the difference between them.
19. What are the primary cost estimating techniques used by the CG? List the advantages and disadvantages of both.
20. Describe the differences between Developmental and Operational Testing.
21. What is the Project Manager's role during Developmental and Operational Testing?
22. What are the ten traditional Integrated Logistics Support (ILS) elements?
23. Explain how ILS elements contribute to the supportability of an asset through its lifecycle.
24. Explain the relationship between ILS elements and System Engineering.
25. Explain Coast Guard's Configuration Management process, include configuration identification, configuration control and configuration control board.
26. What other logistical considerations must be taken in account regarding CG cutter assets?
27. Information technology- Explain the difference between embedded, AIS, and C4IT systems and issues with each.

C. Mission Support Planning.

1. Explain the role of the Deputy Commandant for Mission Support (DCMS).
2. What are the four DCMS cornerstones regarding mission support?
3. What are the six DCMS Logistic and Service Centers?
4. What is the function and primary responsibility of the following centers?
 - a. Logistic Center
 - b. Service Center
5. Explain the primary functions of the Asset Project Office (APO) and how they relate to DCMS.
6. How does the APO help transition newly acquired Coast Guard assets to the fleet?

D. Contracts.

1. What is the definition of a contract?
2. What types of contracts are commonly used by the Coast Guard?
3. Compare the risks associated with a Firm Fixed Contract and a Cost Reimbursement Contract.
4. When would you use an Indefinite-Delivery and Indefinite-Quantity (IDIQ) contract?
5. When would you use a Blanket Purchase Agreement (BPA)?
6. What is the difference between an IDIQ and a BPA?
7. Describe the current Web Applications and Business Tools used to track and record contract work, i.e. Contract Workbook.
8. Define the following:
 - a. Contract Line Item Number (CLIN)
 - b. Contract Data Requirements List (CDRL)
 - c. Statement of Objective (SOO)
 - d. Statement of Work (SOW)
 - e. Performance Work Statement (PWS)
9. Explain the Contractor Performance Assessment Reporting System (CPARS)

SECTION 6201 – REQUIRED TASKS

SIGNATURE/DATE

A. PROGRAM MANAGEMENT FUNDAMENTALS

Complete all course requirements and apply for DHS Acquisition Program Manager Level I, Life Cycle Logistics Level I, **OR** Systems Engineering Level I Certification.

(Information and links on obtaining DHS Level I certifications can be found on Naval Engineering Career Portal site: <https://cgportal2.uscg.mil/communities/naval-engineering-career-info>.)

B. CONTRACT FUNDAMENTALS

Draft the following contract documents:

1. SOO
2. SOW
3. PWS
4. Sole Source Justification

COMPLETION RECORD OF CHAPTER 6

FUNDAMENTALS

SIGNATURE/DATE

6101 Program Management Fundamentals

PERFORMANCE QUALIFICATION

6201 Required Tasks

**OER ENTRY OF CHAPTER 6 COMPLETION
(SUPERVISOR)**

OER entry completed

**ENTER THE FOLLOWING COMPETENCIES
ACHIEVED FOR COMPLETION OF CHAPTERS
5 AND 6 OF THE NAVAL ENGINEER PQS:
ENG-MGT AND ENG-SH2.**

Competencies entered

**DOCUMENT COMPLETION OF DHS ACQUISITION
PROGRAM MANAGER LEVEL I, LIFE CYCLE
LOGISTICS LEVEL I, OR SYSTEMS ENGINEERING
LEVEL I CERTIFICATION IN OER AND RECORD OF
PROFESSIONAL DEVELOPMENT, FORM CG-4082.**

OER entry completed

**SUBMIT MEMO OF COMPLETION OF NAVAL
ENGINEER PQS PROGRAM TO COMMANDANT
(CG-4) THRU COMMANDANT (CG-45) IAW
APPENDIX A. DOCUMENT COMPLETION
IN OER AND RECORD OF PROFESSIONAL
DEVELOPMENT, FORM CG-4082.**

Date of Program Completion

Signature (Product Line Manager/Commanding
Officer/Office Chief)

APPENDIX A - SAMPLE COMPLETION MEMO OF BOTH PARTS OF PQS

U.S. Department of
Homeland Security

United States
Coast Guard



Commander
United States Coast Guard
Surface Forces Logistics Center
MEC Product Line

Street Address
City, State, Zip Code
Staff Symbol:
Phone:
Fax:

1520

MEMORANDUM

From: P. L. Manager, CDR
CG SFLC-MECPL

To: COMDT (CG-4)
Thru: COMDT (CG-45)

Subj: NAVAL ENGINEER PERSONNEL QUALIFICATION STANDARD COMPLETION

Ref: (a) Naval Engineer Personnel Qualification Standard, COMDTINST M3502.11 (series)

1. I am very pleased to inform you that LT Naval N. Gineer has completed Chapters 1-6 of the Naval Engineer Personnel Qualification Standards. This accomplishment makes him/her eligible for consideration for assignment as EO afloat and to other Naval Engineering positions effective 01 July 2013.

2. Attached to this letter are copies of the signatures required at the completion of each assigned task in reference (a).

#

Enclosure: (1) Signatures from the Naval Engineer Personnel Qualification Standard

Copy: CGPC (adm-3)

APPENDIX B - SAMPLE DESIGNATION MEMO FROM COMMANDANT (CG-4)

U.S. Department of
Homeland Security

United States
Coast Guard



Commandant (CG-4)
United States Coast Guard

2703 Martin Luther King JR Ave SE
Stop 7714
Washington, DC 20593-7714
Staff Symbol: CG-4
Phone: (202) 475-5719

1520

MEMORANDUM

From: R. J. Rábago, RADM
COMDT (CG-4)

To: N. N. Gineer, LT
Thru: CG SFLC-MECPL

Subj: NAVAL ENGINEER PERSONNEL QUALIFICATION STANDARDS
COMPLETION AND DESIGNATION AS A COAST GUARD NAVAL ENGINEER

Ref: (a) Naval Engineer Personnel Qualification Standard, COMDTINST M3502.11 (Series)

1. I am very pleased to note your satisfactory completion of the prescribed qualification program and course of study as outlined in reference (a). In accordance with these requirements and a review of your professional development, you are designated a U.S. Coast Guard Naval Engineer.

2. On behalf of the Naval Engineering community, let me be the first to congratulate you on the accomplishment. We look forward to your membership on a team of professionals dedicated to providing the very best engineering support to our fleet. Welcome to the team.

3. In order to obtain Naval Engineering Officer Specialty Code CG-ENG12, fill out an Officer Specialty Code Application – Addition, Form CG-5319A with a copy of this letter and signed Naval Engineer Designation Certificate, Form CG-3500, and submit to OPM-3 for entry in your official record.

#

Enclosure: (1) Naval Engineer Designation Certificate, Form CG-3500