

NONRESIDENT TRAINING COURSE



April 1992

# **Engineman 2**

NAVEDTRA 14076

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

Although the words "he," "him," and "his" are used sparingly in this course to enhance communication, they are not intended to be gender driven or to affront or discriminate against anyone.

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

COMMANDING OFFICER NETPDTC 6490 SAUFLEY FIELD RD PENSACOLA, FL 32509-5237

ERRATA #1

26 July 1999

Specific Instructions and Errata

#### ENGINEMAN 2

1. No attempt has been made to issue corrections for errors in typing, punctuation, etc., that do not affect your ability to answer the question or questions.

2. To receive credit for deleted questions, show this errata to your local course administrator (ESO/scorer). The local course administrator is directed to correct the course and the answer key by indicating the question deleted.

3. Assignment Booklet

Make the following changes:

- 4-44 ADD the word "rise" after 20°F
- 4-54 CHANGE "clean oil" to "cleaning fluid"

Delete the following questions, and leave the corresponding space blank on the answer sheet:

#### Question

4-4

4-63

### PREFACE

By enrolling in this self-study course, you have demonstrated a desire to improve yourself and the Navy. Remember, however, this self-study course is only one part of the total Navy training program. Practical experience, schools, selected reading, and your desire to succeed are also necessary to successfully round out a fully meaningful training program.

**COURSE OVERVIEW**: In completing this nonresident training course, you will demonstrate a knowledge of the subject matter by correctly answering questions on the following subjects: Administration and Training; Measuring and Repair Instruments; Internal Combustion Engines; Speed Control Devices; Refrigeration and Air Conditioning; Compressed Air Systems; Laundry, Mess Decks, Galley, and Scullery Equipment; Auxiliary Equipment; and Lathe and Machining Operations.

**THE COURSE**: This self-study course is organized into subject matter areas, each containing learning objectives to help you determine what you should learn along with text and illustrations to help you understand the information. The subject matter reflects day-to-day requirements and experiences of personnel in the rating or skill area. It also reflects guidance provided by Enlisted Community Managers (ECMs) and other senior personnel, technical references, instructions, etc., and either the occupational or naval standards, which are listed in the *Manual of Navy Enlisted Manpower Personnel Classifications and Occupational Standards*, NAVPERS 18068.

**THE QUESTIONS**: The questions that appear in this course are designed to help you understand the material in the text.

**VALUE**: In completing this course, you will improve your military and professional knowledge. Importantly, it can also help you study for the Navy-wide advancement in rate examination. If you are studying and discover a reference in the text to another publication for further information, look it up.

> 1992 Edition Prepared by ENC Renato D. Dizon

Published by NAVAL EDUCATION AND TRAINING PROFESSIONAL DEVELOPMENT AND TECHNOLOGY CENTER

> NAVSUP Logistics Tracking Number 0504-LP-026-7420

# Sailor's Creed

"I am a United States Sailor.

I will support and defend the Constitution of the United States of America and I will obey the orders of those appointed over me.

I represent the fighting spirit of the Navy and those who have gone before me to defend freedom and democracy around the world.

I proudly serve my country's Navy combat team with honor, courage and commitment.

I am committed to excellence and the fair treatment of all."

# CONTENTS

CHAPTER	Page
1. Administration and Training	. 1-1
2. Measuring and Repair Instruments	. 2-1
3. Internal Combustion Engines	. 3-1
4. Speed Controlling Devices	. 4-1
5. Refrigeration and Air Conditioning	. 5-1
6. Compressed Air Systems	. 6-1
7. Laundry, Mess Decks, Galley, and Scullery Equipment	. 7-1
8. Other Auxiliary Equipment	. 8-1
9. Lathe and Machining Operations	. 9-1
APPENDIX	
I. References	AI-1
II. Units of Measurement Charts	AII-1
INDEX INDEX	EX-1

## **INSTRUCTIONS FOR TAKING THE COURSE**

#### ASSIGNMENTS

The text pages that you are to study are listed at the beginning of each assignment. Study these pages carefully before attempting to answer the questions. Pay close attention to tables and illustrations and read the learning objectives. The learning objectives state what you should be able to do after studying the material. Answering the questions correctly helps you accomplish the objectives.

#### SELECTING YOUR ANSWERS

Read each question carefully, then select the BEST answer. You may refer freely to the text. The answers must be the result of your own work and decisions. You are prohibited from referring to or copying the answers of others and from giving answers to anyone else taking the course.

#### SUBMITTING YOUR ASSIGNMENTS

To have your assignments graded, you must be enrolled in the course with the Nonresident Training Course Administration Branch at the Naval Education and Training Professional Development and Technology Center (NETPDTC). Following enrollment, there are two ways of having your assignments graded: (1) use the Internet to submit your assignments as you complete them, or (2) send all the assignments at one time by mail to NETPDTC.

**Grading on the Internet:** Advantages to Internet grading are:

- you may submit your answers as soon as you complete an assignment, and
- you get your results faster; usually by the next working day (approximately 24 hours).

In addition to receiving grade results for each assignment, you will receive course completion confirmation once you have completed all the assignments. To submit your assignment answers via the Internet, go to:

#### http://courses.cnet.navy.mil

**Grading by Mail:** When you submit answer sheets by mail, send all of your assignments at one time. Do NOT submit individual answer sheets for grading. Mail all of your assignments in an envelope, which you either provide yourself or obtain from your nearest Educational Services Officer (ESO). Submit answer sheets to:

> COMMANDING OFFICER NETPDTC N331 6490 SAUFLEY FIELD ROAD PENSACOLA FL 32559-5000

**Answer Sheets:** All courses include one "scannable" answer sheet for each assignment. These answer sheets are preprinted with your SSN, name, assignment number, and course number. Explanations for completing the answer sheets are on the answer sheet.

**Do not use answer sheet reproductions:** Use only the original answer sheets that we provide—reproductions will not work with our scanning equipment and cannot be processed.

Follow the instructions for marking your answers on the answer sheet. Be sure that blocks 1, 2, and 3 are filled in correctly. This information is necessary for your course to be properly processed and for you to receive credit for your work.

#### **COMPLETION TIME**

Courses must be completed within 12 months from the date of enrollment. This includes time required to resubmit failed assignments.

#### PASS/FAIL ASSIGNMENT PROCEDURES

If your overall course score is 3.2 or higher, you will pass the course and will not be required to resubmit assignments. Once your assignments have been graded you will receive course completion confirmation.

If you receive less than a 3.2 on any assignment and your overall course score is below 3.2, you will be given the opportunity to resubmit failed assignments. You may resubmit failed assignments only once. Internet students will receive notification when they have failed an assignment--they may then resubmit failed assignments on the web site. Internet students may view and print results for failed assignments from the web site. Students who submit by mail will receive a failing result letter and a new answer sheet for resubmission of each failed assignment.

#### **COMPLETION CONFIRMATION**

After successfully completing this course, you will receive a letter of completion.

#### ERRATA

Errata are used to correct minor errors or delete obsolete information in a course. Errata may also be used to provide instructions to the student. If a course has an errata, it will be included as the first page(s) after the front cover. Errata for all courses can be accessed and viewed/downloaded at:

#### http://www.advancement.cnet.navy.mil

#### STUDENT FEEDBACK QUESTIONS

We value your suggestions, questions, and criticisms on our courses. If you would like to communicate with us regarding this course, we encourage you, if possible, to use e-mail. If you write or fax, please use a copy of the Student Comment form that follows this page.

#### For subject matter questions:

E-mail:	n314.products@cnet.navy.mil			
Phone:	Comm: (850) 452-1001, Ext. 1826			
	DSN: 922-1001, Ext. 1826			
	FAX: (850) 452-1370			
	(Do not fax answer sheets.)			
Address:	COMMANDING OFFICER			
	NETPDTC N314			
	6490 SAUFLEY FIELD ROAD			
	PENSACOLA FL 32509-5237			

# For enrollment, shipping, grading, or completion letter questions

E-mail:	fleetservices@cnet.navy.mil				
Phone:	Toll Free: 877-264-8583				
	Comm: (850) 452-1511/1181/1859				
	DSN: 922-1511/1181/1859				
	FAX: (850) 452-1370				
	(Do not fax answer sheets.)				
Address:	COMMANDING OFFICER				
	NETPDTC N331				
	6490 SAUFLEY FIELD ROAD				
	PENSACOLA FL 32559-5000				

#### NAVAL RESERVE RETIREMENT CREDIT

If you are a member of the Naval Reserve, you may earn retirement points for successfully completing this course, if authorized under current directives governing retirement of Naval Reserve personnel. For Naval Reserve retirement, this course is evaluated at 6 points. (Refer to Administrative Procedures for Naval Reservists on Inactive Duty, BUPERSINST 1001.39, for more information about retirement points.)

## **Student Comments**

<b>Course Title:</b>	Engineman 2							
NAVEDTRA:	14076		Date:	Date:				
We need some information about you:								
Rate/Rank and Name	e:	SSN:	Command/Unit					
Street Address:		City:	State/FPO:	Zip				
Your comments,	suggestions, etc.:							

**Privacy Act Statement:** Under authority of Title 5, USC 301, information regarding your military status is requested in processing your comments and in preparing a reply. This information will not be divulged without written authorization to anyone other than those within DOD for official use in determining performance.

NETPDTC 1550/41 (Rev 4-00

#### CHAPTER 1

## **ADMINISTRATION AND TRAINING**

Everytime you advance in paygrade, you increase your responsibility for administration and training. This chapter deals briefly with some of your administrative responsibilities and then touches on certain aspects of your responsibility for training others.

#### **ENGINEERING RECORDS AND LOGS**

As an EN2, you will be primarily concerned with updating logs and similar records. Some of the logs and records are official, legal records. Others are used to ensure proper and timely upkeep of the ship's equipment. The information given in the following sections is intended to help you learn how to prepare and use the logs and records. The standard forms for the logs and records are prepared by the various systems commands and the CNO. The forms are for issue to forces afloat and are available as indicated in the Unabridged Navy Index of Publications and Forms, NPFC PUB 2002 D. These forms are revised as conditions warrant and personnel ordering them must be sure they order the most current forms. If you need similar forms for local use, ensure that an existing standard form will not serve the purpose before you request that a special form be prepared and printed.

#### LEGAL ENGINEERING RECORDS

The Engineering Log and the Engineer's Bell Book are the only legal records compiled by the engineering department. The Engineering Log is a midnightto-midnight record of the ship's engineering department. The Engineer's Bell Book is a legal record of any order regarding change in the movement of the propellers.

#### **Engineering Log**

The Engineering Log is a complete daily record, by watches. It covers important events and data pertaining to the engineering department and the operation of the ship's propulsion plant. The log must show the following information:

1. The total engine miles steamed for the day

2. Draft and displacement upon getting underway and anchoring

3. The disposition of the engines, boilers, and principal auxiliaries and any changes in their disposition

4. Any injuries to engineering department personnel

5. Any casualties to engineering department machinery, equipment, or material

6. Other matters specified by competent authority

Depending on your training and watch position, you may have to either make entries in the Engineering Log or both make and verify such entries. Whatever the case, each entry must be made according to instructions given in (1) the Engineering Log form, NAVSHIPS 3120/2D; (2) the *Naval Ships' Technical* Manual (NSTM), chapter 090; and (3) directives issued by the type commander. Each entry must be a complete statement using standard phraseology. The type commander's directives may contain other specific requirements pertaining to the Remarks section of the Engineering Logs for ships of the type.

The *original* Engineering Log, prepared neatly and legibly in ink or pencil, is a legal record. Do NOT keep a rough log. Keep the Engineering Log current. Enter each event onto the Engineering Log as it happens. No erasures are permitted in the log. When a correction is necessary, draw a single line through the original entry so that the entry remains legible. The correct entry must be clear and legible. Corrections, additions, or changes are made only by the person required to sign the log for the watch This person then initials the margin of the page.

The engineering officer of the watch (EOOW) or the senior petty officer of the watch (SPOW) should prepare the remarks for the log and should sign the log before being relieved at the end of the watch or duty day. The engineer officer verifies the accuracy and completeness of all entries and signs the log daily. The log sheets must be submitted to the engineer officer in time to allow him or her to check and sign them before noon of the day following the date of the log sheet(s). The commanding officer approves the log and signs it on the last calendar day of each month and on the date he or she relinquishes command. Completed pages of the log, filed in a post-type binder, are numbered consecutively. They begin with the first day of each month and run through the last day of the month.

When the commanding officer (or engineer officer) directs a change or addition to the Engineering Log, the person directed must comply unless he or she believes the proposed change or addition to be incorrect. In that event, the commanding officer or engineer officer will personally enter his or her comments and sign the log. After the log has been signed by the the commanding officer, it may not be changed without his or her permission or direction.

#### **Engineer's Bell Book**

The Engineer's Bell Book, NAVSHIPS 3120/l, is a record of all bells, signals, and other orders received by the throttleman for movement of the ship's propellers. Entries are made in the Bell Book by the throttleman (or an assistant) as soon as an order is received. Entries are usually made by the assistant when the ship is entering or leaving port, or engaging in any maneuver that is likely to involve numerous or rapid speed changes. This procedure allows the throttleman to devote his or her undivided attention to answering the signals.

The Bell Book is maintained in the following manner:

1. A separate bell sheet is used for each shaft each day, except where more than one shaft is controlled by the same throttle station. In that case, the same bell sheet is used to record the orders for all shafts controlled by the station. All sheets for the same date are filed together as a single record.

2. The time of receipt of the order is recorded in column number 1.

3. The order received is recorded in column number 2. Minor speed changes (generally received via revolution indicator) are recorded by entering the number of rpm ordered. Major speed changes (normally received via engine order telegraph) are recorded using the following symbols:

- a. 1/3-ahead 1/3 speed
- b. 2/3-ahead 2/3 speed
- C. I-ahead standard speed
- d. II-ahead full speed
- e. III-ahead flank speed
- f. z-stop

- g. B1/3-back 1/3 speed
- h. B2/3-back 2/3 speed
- i. BF-back full speed
- j. BEM-back emergency speed

4. The number of revolutions corresponding to the major speed change ordered is entered in column 3. When the order received is recorded as rpm in column 2 (minor speed changes), no entry is made in column 3.

5. The shaft revolution counter reading (total revolutions) at the time of the speed changes is recorded in column 4. The shaft revolution counter reading-as taken hourly on the hour while underway-also is entered in column 4.

For ships and craft equipped with controllable reversible pitch propellers, the propeller pitch in feet and fractions of feet set in response to a signaled speed change, rather than the shaft revolution counter readings, is recorded in column 4. The entries for astern pitch are preceded by the letter *B*. Each hour, on the hour, entries are made of counter readings. This helps in calculating engine miles steamed during the time the propeller pitch remained constant at the last value set in response to a signaled order.

On ships with gas turbine propulsion plants, a bell logger provides an automatic printout each hour. This printout is also provided whenever propeller rpm or pitch is changed by more than 5 percent, when the engine order telegraph is changed, or when the controlling station is shifted. Provision must be made for manual logging of data in the event the bell logger is out of commission (OOC).

Before going off watch, the EOOW signs the Bell Book on the line following the last entry for his or her watch. The next officer of the watch continues the record immediately thereafter. In machinery spaces where an EOOW is not stationed, the bell sheet is signed by the watch supervisor.

**NOTE:** A common practice is also to have the throttleman sign the Bell Book before it is signed by the EOOW or his or her relief.

The Bell Book is maintained by bridge personnel in ships and craft equipped with controllable reversible pitch propellers and those in which the engines are directly controlled from the bridge. When control is shifted to the engine room, however, the Bell Book is maintained by the engine-room personnel. The last entry made in the Bell Book on the bridge shows the time that control is shifted. The first entry made in the Bell Book