



# NONRESIDENT TRAINING COURSE



October 1993

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# Photography (Basic)

NAVEDTRA 14209

## NOTICE

Pages 1-1, 1-3, 3-6, 12-2, and 12-3 must be printed on a **COLOR** printer.

**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.**

COMMANDING OFFICER  
NETPTDC  
6490 SAUFLEY FIELD ROAD  
PENSACOLA, FL 32509-5237

Errata #1

25 MAY 99

Specific Instruction and Errata for  
Nonresident Training Course

PHOTOGRAPHY (BASIC)

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 questions deleted.
3. Change the following items in the NRTC:
  - a. Question 1-56: change Alt 3 from "545.45 feet" to "45.46 feet"
  - b. Question 2-75: change Alt 2 from "120°F" to "122°F"
  - c. Question 3-52: change the word "camera" in the question's stem to "light meter"
  - d. Page 36, Figure 5A: change Alt E from "How" to "Who"
  - e. Question 6-15: change the first word in line 2 of the question's stem from "control" to "limit"
  - f. Question 7-10: change the date in line 5 of the question's stem from "1885" to "1985"
  - g. Question 9-1: change Alt 3 from "No. 0" to "No. 3"
  - h. Question 9-70: change Alt 3 from "CC05Y + CC15M only" to "CC05Y + CC10M only"
  - i. Question 10-49: change Alt 3 from "Censorship and physical" to "Censorship and physical security"
  - j. Question 10-49: change Alt 4 from "Physical and cryptographic" to "Physical security and cryptographic."
4. Delete the following questions and leave the corresponding spaces blank on the answer sheets:

Questions: 3-21, 3-27, 3-28, 6-54, 10-45



## 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 topics: Theory of Light and Optical Principles; Light Sensitive Cameras and Controls; Basic Photographic Techniques; Photographic Assignments; Portraiture; Copying; Chemical Mixing; Image Processing and Control; Black-and-White Printing; Color Printing; Motion Media; and Job Control and Photographic Finishing.

**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.

*1993 Edition Prepared by  
PHC(AW) Dale Freelan*

Published by  
NAVAL EDUCATION AND TRAINING  
PROFESSIONAL DEVELOPMENT  
AND TECHNOLOGY CENTER

**NAVSUP Logistics Tracking Number  
0504-LP-026-8540**

## **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.”

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# SUMMARY OF PHOTOGRAPHER'S MATE TRAINING MANUALS

## PHOTOGRAPHY (BASIC)

*Photography (Basic)*, NAVEDTRA 12700 consists of the following subjects: the principles associated with light, optics, cameras, light-sensitive materials, and equipment; still and motion-media shooting techniques; chemical mixing; image processing and printing; job control; and photographic finishing.

## PHOTOGRAPHY (ADVANCED)

*Photography (Advanced)*, NAVEDTRA 12701 consists of the following subjects: aerial photography; photographic quality assurance; electronic imaging; photographic layout and design; photographic supply; and silver recovery.



# CREDITS

The illustrations listed below are included in this edition of *Basic Photography*, through the courtesy of the designated sources. Permission to use these illustrations is gratefully acknowledged. Permission to reproduce illustrations and other materials in this publication must be obtained from the source.

<u>SOURCE</u>	<u>FIGURES</u>
Beckman Instruments, Inc.	9-3
Bogan Photo Corporation	5-2
EG&G, Inc., Electro-Optics Division	10-24
GMI Photographic Inc.	4-6
Ilford Photo	11-7
Kreonite, Incorporated	9-4, 12-6
X-Rite, Inc.	10-26

# 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: n313.products@cnet.navy.mil  
Phone: Comm: (850) 452-1001, Ext. 2167  
DSN: 922-1001, Ext. 2167  
FAX: (850) 452-1370  
(Do not fax answer sheets.)  
Address: COMMANDING OFFICER  
NETPDTC N313  
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  
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## **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 15 points. These points will be credited to you upon satisfactory completion of the assignments as follows:

<u>UNIT</u>	<u>ASSIGNMENTS</u>	<u>POINTS</u>
1	1-8	12
2	9-10	3

(Refer to *Administrative Procedures for Naval Reservists on Inactive Duty*, BUPERSINST 1001.39, for more information about retirement points.)

## Student Comments

**Course Title:** Photography (Basic)

**NAVEDTRA:** 14209 **Date:** \_\_\_\_\_

**We need some information about you:**

Rate/Rank and Name: \_\_\_\_\_ SSN: \_\_\_\_\_ Command/Unit \_\_\_\_\_

Street Address: \_\_\_\_\_ City: \_\_\_\_\_ State/FPO: \_\_\_\_\_ Zip \_\_\_\_\_

**Your comments, suggestions, etc.:**

<p><b>Privacy Act Statement:</b> 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.</p>
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NETPDTC 1550/41 (Rev 4-00)

# CHAPTER 1

## THEORY OF LIGHT AND OPTICAL PRINCIPLES

Light is the photographer's medium, and a photograph is the image of a pattern of light recorded on film. The word *photography* means *writing or drawing with light*. Without light there could be no vision or photography because it is light reflected from the world around us that makes things visible to both our eyes and the eye of the camera. The nature of light has a critical effect on the pictures you make. Few photographers actually understand much about light. But they are not alone. Scientists have never been able to agree fully about the nature of light. However, certain useful things are clear and well understood about how light behaves.

Light is a form of electromagnetic radiant energy to which the eye is sensitive. It travels at tremendous speed from its source, such as the sun, a fluorescent lamp, an

electronic flash, or whatever source is used. It has an effect on the materials it falls on, skin becomes tanned, and fruit is ripened by the light of the sun. Depending on the way in which light is received or rejected, a complex pattern of light, shade, and color results.

Other types of radiant energy, such as radio waves and X rays, are similar to light but the eye cannot see them. Thus they are not light. By definition, light is electromagnetic energy visible to the human eye. All other electromagnetic energy is invisible, therefore, is not considered light. Ultraviolet and infrared radiations are two such invisible radiations that are of concern to the photographer.

Light makes up the visible spectrum, which is a small part of the entire electromagnetic spectrum (fig. 1-1).

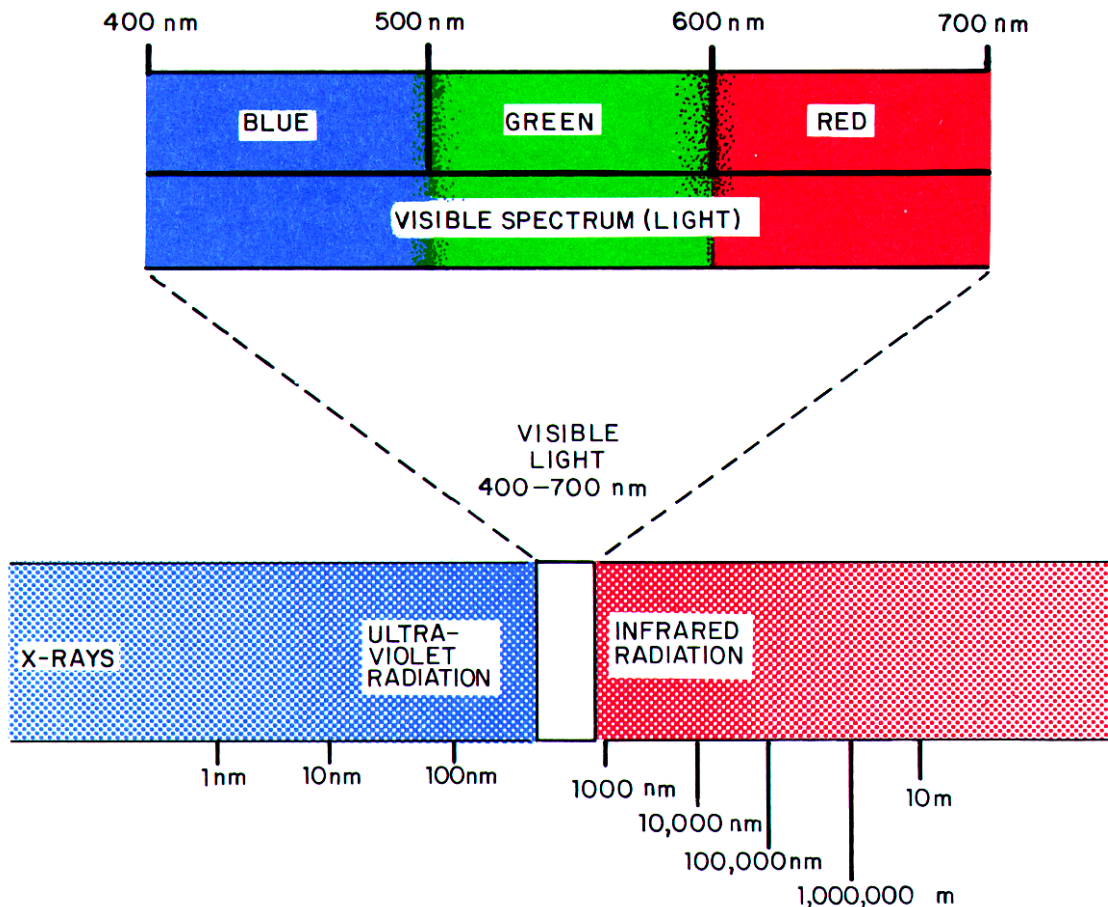


Figure 1-1.—The electromagnetic energy spectrum.

C302.7