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ABSTRACT

An exploratory study was conducted to evaluate the feasibility of determining the reading demands of navy jobs, using a methodology that identifies both the type of reading tasks performed on the job and the level of general reading skill required to perform that set of reading tasks. Next, a survey was made of the navy's job skills training program, career counseling system, and General Education Development System. Based on the results of these two efforts, a general plan was designed, outlining the initial development of a job-related reading training program and its later integration into the navy's job skills training program. (Author)

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An exploratory study was conducted to evaluate the feasibility of determining the reading demands of Navy jobs using a methodology that both identifies the type of reading tasks performed on the job and the level of general reading skill required to perform that set of reading tasks. Next, a survey was made of the Navy's job skills training program, career counseling system, and General Education Development System. Based on the results of these two efforts, a general plan was designed outlining the initial

development of a job-related reading training program and its later integration into the Navy's job skills training program.

FOREWORD

This research and development was conducted in support of Exploratory Development Task Area ZF522.011 (The Assessment and Enhancement of Prerequisite Skills).

The overall project covered comprised two phases. The first phase, which provided information on the role of reading skills within the context of the Navy's occupational and career development systems, was documented by NPRDC TR 77-40, The Role of Reading in the Navy (Sticht, Fox, Hauke, & Zapf, 1977). The second phase, which is documented by this report, provides a general approach to the design, development, and implementation of a training system that incorporates both job skills and learning/communication skills improvement within an integrated framework.

The results of this study are intended for use by the Chief of Naval Education and Training. Dr. Thomas Duffy acted as contract monitor.

J. J. CLARKIN
Commanding Officer

SUMMARY

Problem

In the past, training research and development efforts have been directed at adapting the training system to individual differences in cognitive and affective processes. Recently, R&D efforts have been initiated for providing training to help the learner become a more adaptive person by improving his basic learning communication skills within the context of an adaptive training program. One such skill is reading; that is, using written language in performing job tasks. Although reading and writing skills are widely used in Navy school and job settings, approximately 20 percent of the Navy's enlisted personnel have reading problems that can hinder fleet readiness and career development. Although such personnel seem favorably disposed toward training that improves job skills, they apparently do not make full use of the existing Navy education system, at least in part because they do not consider it relevant to either their job duties or their career development.

Purpose

The purpose of the present effort is to design a general plan for the development of an integrated job skills/reading skills training system.

Approach

Reading demands of Navy ratings were determined by (1) identifying job reading tasks, (2) classifying these tasks in some general taxonomy, (3) constructing a Navy Reading Task Inventory (NRTI) and Navy Reading Task Test (NRTT), (4) scaling the reading difficulty level of Navy reading tasks, and (5) weighting the occurrence of different tasks in different jobs by frequency and criticality of performance.

The next step was to review the components of the Navy's training system to identify any existing formal or informal linkages between them that might be used to facilitate the integration of job skills and literacy skills training. Based on the results of these two efforts, a general plan was designed outlining the initial development of a job-related reading training program and its later integration into the Navy's job skills training program.

Results

Results from administering the NRTT to a Navy sample indicated that the sample had a median reading grade level of 10th grade, which is consistent with previous findings. In addition, the NRTT data showed that 22 percent of the sample had a reading grade level (RGL) below the 8th grade level. Thus, it appears that a fair number of Navy personnel do have reading problems.

Survey of the components of the Navy's training system indicated that there is a relatively close interaction, of a formal nature, between the job skills training system and the career counseling system, but little or no formal interaction between these systems and the general education system.

Basically, there are two formal policy linkages between the job skills training and GED systems: (1) the Academic Remedial Training (ART) program for identified low literate personnel and (2) the required educational opportunities/services orientation given to all new personnel within 30 days of their arrival at a new duty station. For all intents and purposes, there are no content linkages between the job skills training and the GED systems.

The general plan designed for a job-related reading training program consists of immediate and long-range changes. The immediate changes are (1) to tighten existing policy (formal) linkages between the components of the Navy's training system and (2) to increase the content linkages between recruit training and ART. The long-range changes are (1) to develop individual job-related reading programs for personnel in Class A schools, in recruit training, and assigned to permanent duty stations, and (2) to integrate these reading programs into the job skills training system.

Conclusions

1. It appears that the NRTI/T approach can, with additional refinement, be used effectively to assess the reading demands of Navy ratings, as well as to provide information on job-related reading curricula and objectives.

2. Inspection of the career counseling system indicates that reading could act as a barrier to advancement for a substantial number of enlisted personnel and that the Navy does not have any systematic approach to literacy training.

3. Even though there are limited linkages between the components of the Navy's training systems, it does seem quite possible to utilize the current system in the development of the integrated job skills/reading skills training system with only minor modifications.

Recommendations

To improve the job proficiency of personnel while reducing the costs of training, it is recommended that:

1. The training programs be systems engineered and self-paced to reduce training time.

2. Training time be reduced for reading programs such as ART by converting general reading training into job-oriented reading training and then integrating the job skills and reading skills training.

3. The effectiveness of reading training be increased by converting GED programs into job-related reading programs.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

Problem

Over the years, the Armed Services have pursued training research and development efforts focused on methods for adapting the training system to individual differences in the trainee's cognitive and the affective processes. Recently, research and development efforts have also been initiated for studying methods for providing training that would help the learner to become a more adaptive person by improving his basic learning/communication skills within the context of an adaptive training program. That is, the job skills training program is designed to adapt to the individual learning/communication needs of the trainee, while simultaneously providing additional training to improve those learning/communication skills in which he appears to be deficient. If the Armed Forces are to prepare personnel to function in the more compact, technically-oriented military force of the future, their future R&D efforts must focus on producing more adaptive training programs and more adaptive personnel.

Background

Work in this area in the Navy has been undertaken at the Navy Personnel Research and Development Center (NAVPERSRANDCEN), San Diego, California, by Duffy, Carter, Fletcher, and Aiken (1975) in an R&D program that focuses initially on improving skills for performing tasks involving written materials.

To complement this and other NAVPERSRANDCEN efforts to improve Navy training programs and to enhance the learning strategies and basic capabilities of Navy personnel, the Human Resources Research Organization (HumRRO) was contracted to study literacy skills, primarily reading skills, in relation to various Navy ratings and at various stages of an enlisted person's career.

The HumRRO effort was conducted in two phases. The first phase, which was documented in NPRDC TR 77-40 (Sticht, Fox, Hauke, & Zapf, 1977) was a study of the role of reading and, to a lesser extent, writing skills within the context of the Navy's occupational and career development system. In this study, a structured Navy Job Reading Task Interview was administered to a sample of enlisted personnel composed of students, instructors, and job performers. The interview consisted of three sections. The first section was designed to obtain data on general reading and writing activities; and the second, to elicit specific job reading task data; that is, reading that is required to complete a job task. The third section was concerned with personnel attitudes toward the Navy training system, reading problems, and reading training.

Data obtained from the structured interview indicated that reading and writing skills are widely used in Navy school and job settings, and that the use of these skills appears to increase in the more technical or data-oriented ratings and at the higher rates. Subjects indicated that reading problems were experienced by 20 percent of students in both Class A schools and rate training courses, by 15 percent of persons in recruit training, and 15 percent of those who were performing on the job. At least one fourth indicated

that they, themselves, had "some difficulty" in understanding the materials used in each of these four career activities.

Many Navy personnel felt that they could benefit from reading training, particularly if that training were job-oriented. However, they do not regard everything taught in job skills training programs as relevant to their jobs. In many cases, what was taught was viewed as being of more importance for passing the Navy-wide exam than for doing the job. This suggests that the job skills training programs might benefit from systems engineering oriented towards reducing "nice-to-know" course content, with increased emphasis on mastery of "need-to-know" content.

Further information obtained during the interview, dealing with the importance of off-duty education for job performance, indicated that between 75 to 95 percent of the personnel had not had any off-duty education which they viewed as relevant to their job. Of seven job performers who reported off-duty education, only two said it was important for their present job; none, for the Navy-wide exam; and one, for a new job. Thus, although Navy personnel seem favorably disposed toward training that improves their job skills, including job-related reading training, they apparently do not utilize the current education system to a great extent, at least in part because it is not considered relevant to either their job duties or their opportunities for career development.

These findings suggest the possibility of designing a comprehensive job-related literacy training system for Navy personnel that would: (1) systematically relate to job reading demands and career development, and (2) provide a job-functional context for the teaching of skills and knowledges needed to successfully accomplish job reading tasks at the highest rung of the career ladder. Through the development of closer linkages between the general educational development system and the job skills training system, it should be possible to develop a training system that is both adaptive to the needs of individuals in the Navy, and capable of producing a more adaptive individual whose basic, generic skills render him more generally useful to the Navy, to the society at large, and to himself.

Purpose

The purpose of the second phase of the HumRRO effort then, which is documented in this report, is to design a general plan for the development of an integrated job skills/reading skills training system.

APPROACH

The complete design, development, and evaluation of a career-oriented literacy training system is a large undertaking, requiring considerable time, money, manpower, and facilities. It is important, therefore, that the R&D work proceed in a systematic manner according to a carefully prepared plan. This plan must permit the achievement of the ultimate goals of the R&D program within the constraints of the Navy as an operational system.

Figure 1 presents a general plan for producing a comprehensive, integrated job skills and literacy skills career development system in the Navy. The first step of the plan calls for a thorough analysis of reading within the Navy, including the determination of general reading levels for performing job-related reading tasks so that reading training objectives may be targeted to job requirements. In this regard, Sticht et al. (1977) have presented information of a general nature about reading in the Navy. Next, methodologies were examined for making more precise determinations of the reading demands of Navy ratings. This examination includes a brief discussion of various methods that have been developed for determining reading demands of jobs by military and civilian research organizations. Also, results are presented for exploratory research by the present project to develop a Navy Reading Task Inventory for determining reading demands of Navy ratings.

An additional aspect of the step 1 activities given in Figure 1 is the study of job skills training and the general education system within the Navy to determine the feasibility of improving linkages in these systems, and potential for revising these systems to produce a more integrated job skills and literacy skills training system. Information relevant to these career development subsystems was obtained via site visits to Navy Training Centers, interviews with cognizant Navy and civilian training personnel, and review of relevant Navy and civilian literature. This information is discussed in relation to the design of an integrated job skills and literacy skills system having the components indicated in step 2 of Figure 1.

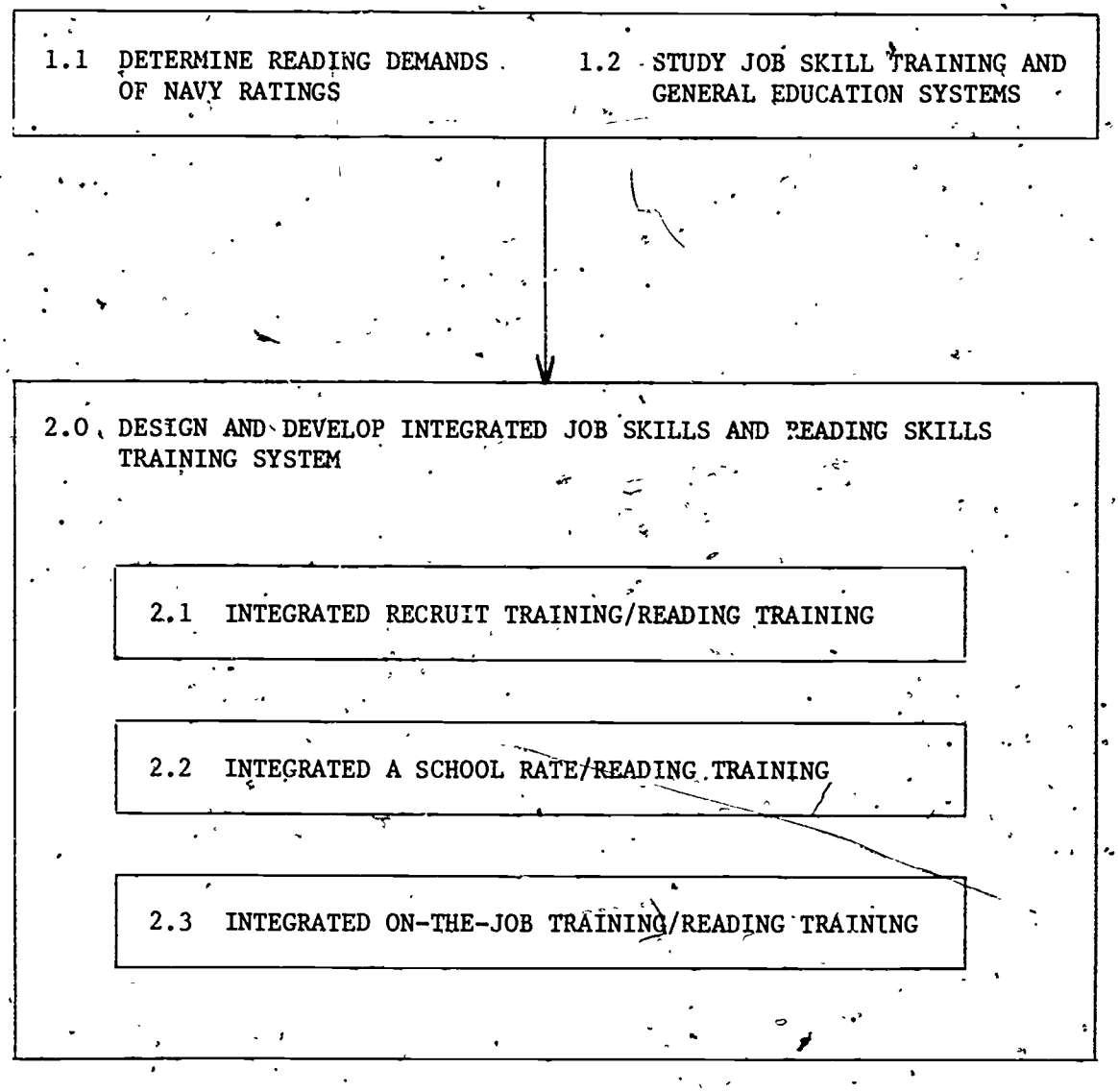

Figure 1. General plan for developing an integrated Job Skills Reading Skills Training System.

DETERMINING READING DEMANDS OF NAVY RATINGS

Methods for Establishing Job Reading Demands

In the past, the reading demands of civilian and military jobs have been stated (1) in terms of the types of reading materials and reading tasks the job involves (the summary task statement method), and (2) as a single index number denoting the reading grade level (RGL) of ability needed to perform well on the job (the summary index number method).

Summary Task Statement Method

In this approach, job analysts or others interview management personnel, and sometimes workers, to determine whether or not a given job requires reading. If so, a simple statement to that effect is recorded in the job description. An example of this approach is Army Regulation 611-201 (5 Jan 67), Enlisted Military Occupational Specialities, which says, for example, that the field radio repairman's job "requires verbal and reasoning ability to read and understand technical material pertaining to maintenance of field radio equipment," and that the ground vehicle repairman's job "requires verbal and reasoning ability to read and understand technical materials pertaining to equipment being maintained." Although such job statements are found in documents throughout the Armed Forces, they are inadequate for determining training objectives or curricula to develop reading skills. For such purposes, more detailed descriptions of the various reading tasks performed are desired.

In the first phase of this project, the authors employed a checklist of materials (e.g., notices, messages, and manuals) that people commonly read on the job to specify reading tasks (Sticht et al., 1977). Sharon (1972) used a similar method to determine what kinds of materials are read by adults in the United States. Although such methods identify what people read more precisely than does the task statement approach, they fail to identify why people read certain materials, how difficult the materials are, or how often the materials are used.

A recent project by the Department of Manpower and Immigration of Saskatchewan, Canada has refined the summary task statement method (Smith, 1975). The reading tasks performed in various career fields were analyzed to find out both what kinds of materials (e.g., notes, memos, letters, directions, instructions, policy manuals, and procedural manuals) are read and why they are read (e.g., to locate and understand the main point or area, to follow directions, to put details in order, to notice and interpret how fact or details are related, and to make comparisons). To obtain this information, interviewers depicted the general type of material they were talking about. For instance, to determine if a given job required the reading of graphs, two graphs were shown and interviewees were asked to indicate whether or not they read similar graphs in performing their jobs.

This method of deriving summary task statements deals not only with what must be read in greater detail, but also with why a person reads that material. Additionally, the Canadian work has distinguished ent -level

from advanced level reading requirements by asking respondents to indicate what reading tasks they performed (1) when they first entered the job and (2) at present.

The Canadian method clearly provides more useful information than the typical summary task statement or list of materials. If curriculum planners know the types of reading tasks performed in different occupations, they can include activities for training people to perform these tasks. Also, they can design curricula to include instructional tasks using materials similar to those used in various career fields.

Even though the Canadian approach far surpasses the typical summary task statement in specification of reading tasks, it still fails to precisely specify reading tasks. For instance, the questions of what materials job holders read and why they read are asked separately, without reference to one another. Thus, although we learn that, in a given job, a person reads policy manuals and this same person reads to follow directions, we do not know that he reads to follow directions in policy manuals. A more explicit statement of a reading task would include both a statement of what was read and why it was read.

Summary Index Number Method

There are five common methods of assigning summary index numbers to job reading demands: (1) educator estimates, (2) job analysts' judgments, (3) readability formulas, (4) correlation of reading and job proficiency measures, and (5) job reading task tests.

Educator Estimates. Perhaps the most widely used method for stating job reading demands is the reading grade level (RGL) index number. This apparently is because the need to state reading demands of jobs has usually accompanied the need for literacy training. For instance, in World War II, the Army was required to establish literacy training for many low literate personnel (Goldberg, 1951). That training's goal was to bring reading skills up to the level typically achieved by children in the 4th grade. The Navy set up a similar program for its recruits, with a nominal goal of achieving 5th grade reading proficiency (Fletcher, 1976). These levels were established by educators as estimates of the minimal reading demands of Army and Navy jobs. Since WW II, whenever large mobilization efforts have resulted in the induction of large numbers of marginally literate personnel, the Armed Forces have all established reading training programs whose goals were represented by RGL index numbers (Sticht & Zapf, 1976).

Job Analysts' Judgments. In civilian settings, the Department of Labor (DOL) has sought ways to establish the reading demands of jobs, for use in programs aimed at providing marginally literate persons with marketable reading skills. In the DOL approach, job analysts estimate the levels of General Educational Development (GED) required for various jobs, based on interviews with job performers and supervisors, and on observation of the job being performed. Jobs are then categorized as requiring one of six levels of GED that roughly parallel school-based educational development. For example, a GED of level 1 approximates the education obtained in grades 1-3 and level 2 parallels that of grades 4-6 (Phillips, 1970).

This approach, like the first, is judgmental. Although relatively low in cost, the lack of specificity in the rules for arriving at a judgment of the GED level (and, hence, the reading level of the job) and the absence of empirical information to validate the estimates render this method too imprecise and uncertain for establishing reading demands of jobs.

Readability Formulas. The development of specially constructed readability formulas makes possible a relatively low cost method for estimating reading demands of jobs. By applying a readability formula to samples of job reading materials, an average RGL of difficulty for the materials can be computed and used to represent the reading requirements of the job or job training program.

Readability formulas have typically been constructed by two means. In one approach, prose passages from school textbooks of various grade levels are sampled and features such as average sentence length and the number of one-syllable words in 100 words are determined (Fry, 1968). These features are then used in correlational analyses to find out how well they can be used to predict the school grade level of the material. Generally, average sentence length and word length increase as materials from higher grades are sampled. Because of this positive correlation, it is possible to determine average values for features such as sentence and word length, enter these values in a regression equation, and then state that materials having those values are typically found, say, in the 6th grade of school.

However, since this approach does not involve any direct measure of people's abilities to comprehend the materials, it is not known what percentage of 6th grade students can actually comprehend the material having the structural features typical of materials found at the 6th grade. For this reason, most readability formulas have been constructed to relate features of textual material such as sentence and word length to performance or tests of comprehension. An RGL is then assigned to the material by setting a criterion of accuracy on the comprehension test, say 70 percent correct, and determining the earliest grade level at which some designated proportion of people, say 50 percent, attain that score on the comprehension test. If, on a given comprehension test, it was not until the 6th grade that 50 percent of the students got 70 percent correct, that material would be assigned a 6th grade reading difficulty or readability value.

To use such a formula to determine job reading demands, one must:

1. Identify job reading materials.
2. Sample the materials representatively.
3. Calculate the critical features (e.g., average sentence length).

4. Use these features in the readability formula to obtain an estimate of the comprehension score 70 percent of the people would get if they were to take a comprehension test like the one used to construct the formula.

5. Convert that score to a grade level score using appropriate tables (if step 4 provides a direct estimate of reading difficulty in reading grade score equivalents, step 5 is unnecessary).

6. Obtain the average RGL of all the materials sampled. This is the RGL demanded by the job.

There are a number of problems in using this approach to determine the reading requirements of jobs. First, it depends not only on the features of the text materials, but also on the comprehension test items, the criterion set as the acceptable score on the test (e.g., 70% correct), and the criterion set for the proportion of people at each grade level (e.g., 50%) who must achieve the criterion score. For example, in an Army-sponsored study, Caylor, Sticht, Fox, and Ford (1973) found that they could increase the RGL assigned to some materials by as much as two to three levels merely by increasing the criterion score on the comprehension test from 30 to 35 percent correct.

Second, in using this method, it may not be possible to obtain a representative sample of job materials or even to determine the proper domain of materials from which sampling should be done. In this regard, a major difficulty can arise due to the distinction between formal job task specifications and the actual or informal job tasks that are performed daily. If persons consulted regarding reading materials used in doing a job base their statements on their conception of the formal job, they are likely to list materials that no one could reasonably be expected to use in his normal work-day activities. Also, interviews with employees may produce a distort d sample of job reading materials, either through willful exaggeration or unintentional omission.

Finally, readability measures tend to set reading requirements somewhat higher than do the other empirical methods. For example, Caylor et al. (1973) showed that some Army jobs would require 12th grade or higher skill levels if readability factors only were considered. However, since many persons with reading skills well below that level were performing successfully on those jobs, their findings must be viewed with caution.

Correlation of Reading and Job Proficiency Measures. A general method for estimating job reading requirements is the traditional psychometric procedure used to validate selection and classification tests. In this procedure, performance on a reading predictor test is related via correlational techniques to performance on a job proficiency test. If a sufficiently high relationship exists, cut-off scores on the reading predictor variable can be selected to increase the probability of obtaining students or employees who will reach an acceptable level of achievement on the job proficiency criterion measures.

Sticht (1975b), in conducting research for the Army, applied this procedure to determine reading demands of four jobs: cook, mechanic, supply clerk, and armor crewman. Some 400 experienced men in each rating were administered standardized reading tests and two measures of job proficiency: (1) a 4- to 5-hour job sample test, in which each man performed job tasks derived from job and task analyses, and (2) a paper-and-pencil job knowledge test. In this effort, the lowest level of reading used to establish the reading demands of the job was defined in terms of quartiles; that is, if a person was performing at a level below 75 percent of his fellow job performers, and if his performance was systematically related to reading skill, then it is not unreasonable to target a reading training program at a level associated with not being overrepresented in the lowest fourth of job performers.

It should be noted that the purpose of this effort was to derive a goal for reading training. Since all persons tested were, in fact, working in their jobs, they can be considered as successful job performers. Hence, it was necessary to discriminate among successful job performers to derive goals for reading training.

This method also has some serious limitations. For instance, since the job proficiency measures are likely to be only indirectly mediated by knowledge that may have been learned by reading, the relation of reading to job sample performance should be smaller than those among general reading measures and job reading tasks or other paper-and-pencil measures of job proficiency. This consideration, plus the fact that the costs of constructing an extensive job-sample test and administering it to a representative sample of jobs and job performers are prohibitive would seem to mitigate against the use of such tests for all but fundamental research purposes.

Although correlating reading skill with job knowledge rather than with job proficiency would overcome cost and administrative difficulties and permit standardization, the language skills required to answer test questions may be very different from those required for job knowledge demands. Thus, reading test scores may correlate with a knowledge test not because of the reading demands of the job but because of the language demands of the test. The application of this method is justified only if it can be shown that the job knowledge test reflects job proficiency and that job knowledge, rather than general reading skill per se, was needed for scoring well on the job knowledge tests.

Finally, this method provides no direct indication of how well a person must read to perform job reading tasks. Many job tasks can be learned and performed without reading. Obviously, to the extent that job performance requires reading and job knowledge, the job knowledge test can reflect these demands.

Job Reading Task Tests. The correlational analysis technique can be made more directly relevant to job reading demands by relating general reading skill to performance--not of job tasks in general, but rather of job reading tasks (i.e., tasks in whi n reading is required).

In this regard, Sticht (1975b) interviewed Army cooks, mechanics, and supply clerks at their job sites, asking them to identify reading materials they had used in performing some job task. He then obtained copies of these materials and analyzed them as to the reading tasks involved. Tasks such as "reading tables of contents," "reading indexes," "reading procedural directions," and "reading tables of standards and specifications" were identified and used in constructing special job reading task tests (JRTT) to test individual ability to perform different job reading tasks.

The JRTT and a general reading test were administered to several hundred Army personnel. Results were then used to relate various criterion levels of achievement on the JRTT to the general RGL of ability needed to achieve this criterion.

Thus, it was possible to indicate general reading levels associated with various criterion levels of performance on the job reading tasks as a group. Given this information and a decision about the criterion level of performance that job performers or job aspirants should display on the job reading tasks, a general literacy requirement can be estimated for each job.

In the Army research, it was found that, if a criterion of excellence was chosen such that 70 percent of the people was expected to get 70 percent correct on the job reading tests, the general reading requirement for cooks was the 7th grade level; mechanics, the 8th grade; and supply clerks, the 12th grade.

Of all the methods presented to this point, the job reading task method represents the most direct approach to determining job reading requirements in that it takes as its criterion measure the reading score on the JRTT, a sample of commonly used job reading materials. To the extent that (1) the passages constituting the JRTT represent all the reading tasks of the job, (2) the tasks people are asked to perform on the JRTT represent tasks they have to perform on the job, and (3) job success requires performance of these tasks, then the ability to read the JRTT passages is the ability to perform the job reading tasks and, thus, to meet the job reading requirement.

It should also be noted that, using the JRTT method, reading skill level requirements will change, depending upon the criterion of performance selected. The problem of specifying a criterion must be dealt with in any approach to the determination of reading requirements in which criterion performance measures are obtained. The question is one of "how good is good enough?" It is possible to say that all people should be able to perform all reading tasks with 100 percent mastery but, if there are restricted manpower pools and if many job reading tasks are quite complex, this goal would seem unrealistic.

Development of the Navy Reading Task Inventory/Test (NRTI/T)

Because of the shortcomings noted in both the summary task statement and the summary index number methods, it was decided to incorporate aspects of both in determining the reading demands of Navy ratings. Essentially, the methodology used involves a combination of the approach developed by Smith (1975) to determine reading requirements of Canadian occupations and the job reading task test (JRTT) method developed by Sticht (1975a) for determining reading demands of Army occupations.

As indicated previously, the JRTT method involves identifying reading tasks through interviews with workers and using these tasks in constructing special tests. By relating performance on these tests to that on a standardized reading test, it is possible to state how high a general reading level a person needs, on the average, to be able to perform at a selected criterion level on the JRTT. This reading level then represents the reading demands of the job. The fact that the JRTT approach uses a direct evaluation of a person's ability to perform test items using job-related reading materials is obviously advantageous. However, it also is disadvantageous, because the determination of reading demands of each job requires the testing of personnel in those jobs. On the other hand, the Canadian summary task statement method uses an inventory technique to determine what kinds of materials job performers read, and why they read those materials. Although this inventory technique can be used in any number of jobs, it does not provide general reading levels of occupations.

In the methodology evaluated in the present study, a Navy reading task inventory and test (NRTI/T) were developed. To establish reading requirements of Navy jobs using the inventory approach, it was necessary to identify reading tasks performed in Navy ratings and to scale those tasks according to the level of general reading ability at which the probability of being able to perform the task equals or exceeds some judgmentally established criterion. With this information, the reading demands of a job can be established by computing the average general RGL needed to perform the job reading tasks found in the job duty position. Procedures for accomplishing this activity include (1) identifying job reading tasks, (2) classifying reading tasks in some general taxonomy or categorization system, (3) constructing the Navy Reading Task Inventory (NRTI) and Test (NRTT), (4) scaling the reading difficulty level of Navy reading tasks, and (5) weighting the occurrence of different tasks in different jobs by frequency and criticality of performance to obtain the average level of difficulty of the job reading tasks.

Identifying Job Reading Tasks

In Sticht et al. (1977), specific job reading tasks were defined as enabling subtasks that help the individual accomplish a specific job task. For example, if a quartermaster needs to verify a computation of the times of sunrise and sunset (job task), he would have to refer to the Air Almanac for information about those times at a given latitude and date (enabling

subtask), and verify the computation. Two types of enabling subtasks--reading-to-do and reading-to-learn--were identified based on the type of information processing required to perform the task. A reading-to-do subtask involves looking up or reading information for immediate use in completing a job task; and a reading-to-learn, reading information that is to be retained for later use. Subjects in the Sticht et al. (1977) study (i.e., students, instructors, and job performers in 11 different ratings) were asked to provide examples of both types of reading tasks. A total of 325 tasks was obtained, 186 of which were reading-to-do tasks. Because 70 percent of the tasks reported by job performers fell into this category and the NRTI and NRTT were focused on the job situation, only the reading-to-do tasks were used in the exploratory development of the NRTI and NRTT.[1]

Classifying the Reading Tasks

The first step in the reading task classification procedure was to sort them into the following three job type groups or clusters defined by Sticht et al. (1977):

1. Service/Maintenance, consisting of Boatswain's Mate, Hull Maintenance Technician, and Mess Management Steward ratings.

2. Technical Maintenance/Repair, consisting of Aviation Structural Mechanic, Electrician's Mate, Electronics Technician, and Gunner's Mate ratings.

3. Data, consisting of Aviation Storekeeper, Personnelman, and Quartermaster ratings.

The reading tasks within each job cluster were then examined to determine what kind of skill they required for completion. As a result, two types of skill categories were established: fact-finding and following directions. In the case of fact-finding skills, it was assumed that the individual already knew how to do the particular job but needed some additional information to complete it. For example, suppose the individual was called upon to rig a certain type of boom. He knew <u>how</u> to accomplish the task but needed to use a manual to find out what type of pulley to use.

Following directions skills, on the other hand, involve using a manual or other document to find out how to do a job. For example, suppose the individual was called upon to write a notice. If he did not know how to do it, he would have to consult a correspondence manual for step-by-step instructions.

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[1]A complete kit of 300 specific job reading tasks was developed from the interview data, including job reading tasks for students, instructors, and job performers, and including reading-to-learn and reading-to-do tasks. These materials can be used in developing job reading training curricula and additional test items.

Using these definitions, three raters, all experienced in the study of job reading tasks, sorted the 186 tasks into one or the other of these two skill classifications. The results and the percent of initial agreement among the three raters are shown in Table 1. Agreement as to whether a given task was a fact-finding or following directions task ranged from 63 percent to 100 percent of the tasks on the first sort. Subsequent discussion among the three raters resolved disagreements.

Table 1

Initial Agreement Among Raters Sorting Reading-to-Do Tasks

Rating Clusters	Instructors		Students		Job Incumbents		Total	
	No. of Tasks	% Agree	No. of Tasks	% Agree	No. of Tasks	% Agree	No. of Tasks	% Agree
Serv Maint	7	71	15	87	39	71	61	76
Tech Maint	16	63	18	78	38	68	72	70
Data	6	100	16	63	31	74	53	79

Table 2 shows the results of the classification analysis. Most tasks (N = 110) were classified as fact-finding. Instructors and job performers utilized fact-finding skills two to four times more than following directions skills, while students used following directions skills much more than fact-finding skills (except those in the Data cluster).

Table 2

Classification of Fact-finding and Following Directions Tasks

Rating Clusters	Instructors		Students		Job Incumbents		Total	
	FF	FD	FF	FD	FF	FD	FF	FD
Serv Maint	5	2	4	11	26	13	35	26
Tech Maint	14	2	2	16	18	20	34	38
Data	4	2	10	6	27	4	41	12
TOTAL	23	6	16	33	71	37	110	76

Finally, the 186 tasks were analyzed to identify the type(s) of display contained within each. The following types were identified: (1) text, (2) figures (forms), (3) tables, (4) text and figures, (5) text and tables, and (6) tables and figures.

The initial agreement between raters on this classification task ranged from 80 to 100 percent across job clusters. The average agreement was 90 percent. Discussion among the raters resulted in the final agreement shown in Table 3.

Reading tasks requiring either fact-finding or following directions skills applied to the six display types were found in all of the ratings studied and represent, at an abstract level, the bulk of Navy job reading tasks performed in the course of doing a job task in a job situation.

Table 3

Classification of Job Reading Tasks by Type of Display

Display Types	Rating Clusters							
	Serv/Maint		Tech/Maint		Data		Total	
	FF	FD	FF	FD	FF	FD	FF	FD
Text	16	25	24	33	25	11	65	69
Figures (Forms)	26	12	31	25	15	6	72	43
Tables	7	10	12	6	20	2	39	18
Text & Figures	5	9	14	9	6	3	25	21
Text & Tables	0	7	1	1	7	1	8	9
Tables & Figures[a]	1	0	0	0	3	0	4	0
TOTAL	55	63	82	74	76	23	213	160

[a]This display type was deleted from subsequent analysis because of its minimal occurrence.

Constructing the Navy Reading Task Inventory/Test (NRTI/T)

Development of the NRTI. To develop a concrete set of reading tasks to represent the abstract tasks derived in the classification effort, it was necessary to find displays as source material for testing fact-finding and following directions skills that would not require specific job knowledge but yet would be similar to the materials used in various Navy jobs. The source found to be ideal for this purpose was The Bluejackets' Manual, which covers a wide range of material relevant to all Navy ratings and is the basic manual for new Navy recruits.

For each of the five display types, three examples--easy, medium, and difficult--were selected from the manual. Selection was based on the judged complexity of their information processing requirements. For example, one table might be rated more complex than another based on the number of rows and columns or the amount and type of symbols used. Figures might be rated more or less complex based on the number of callouts or of parts.

Using these displays, two forms of the inventory were constructed, one for job performers and one for their supervisors. For each display included in the inventory, questions were asked on (1) performance, (2) frequency, and (3) criticality (i.e., consequences of making an error) of the reading task. The questions included in the NRTI for performers are shown in Figure 2; and those for supervisors, in Figure 3.

(For Fact-Finding Displays)

(1) In your job would you ever have to perform reading tasks using material like this to look up facts?

YES NO

If YES Answer 2 & 3 | If NO go to next example.

(For Following Directions Displays)

(1) In your job would you ever have to use material like this to following directions?

YES NO

If YES Answer 2 & 3 | If NO go to next example.

(2) How <u>frequently</u> do you perform a reading task similar to this?

1	2	3	4	5
1 to 3 times a year	1 time each month	2 to 3 times a month	1 or more times each week	Daily

(3) What might be the consequence of a reading error with this type of reading task?

1. No consequence.
2. I would be disciplined and some time would be wasted.
3. The job would have to be done over again and some time would be wasted.
4. The job would have to be done over and some materials would be wasted.
5. The job would have to be done over and some people would be inconvenienced.
6. Equipment would be damaged or lost.
7. I might be injured or other personnel might be injured.

Figure 2. Sample of job performer inventory form.

(For Fact-Finding Displays)

(1) Do the personnel whom you supervise perform reading tasks using material like this to look up facts?

YES NO

(For Following Directions Displays)

(1) Do the personnel whom you supervise perform reading tasks using material like this to follow directions?

YES NO

(2) Of the total number of personnel in your rating, what percentages must be able to perform this type of reading task?

0 10 20 30 40 50 60 70 80 90 100

(3) How often would personnel in your rating perform a reading task similar to this?

1	2	3	4	5
1 to 3 times a year	1 time each month	2 to 3 times a month	1 or more times each week	Daily

(4) What might be the consequence of a reading error with this type of reading task?

1. No consequence.
2. The individual would be disciplined and some time would be wasted.
3. The job would have to be done over again and some time would be wasted.
4. The job would have to be done over and some materials would be wasted.
5. The job would have to be done over and some people would be inconvenienced.
6. Equipment would be damaged or lost.
7. The individual might be injured or other personnel might be injured.

Figure 3. Sample of supervisor inventory form.

As shown, the supervisor's inventory, in addition to providing his perception of the performance, frequency, and criticality of a reading task, also obtains an estimate of the percent of people who must be able to perform it. This information was needed for use in conjunction with the expectancy table data generated by the NRTT scaling to establish the task's reading grade difficulty level.

Pilot Testing of NRTI. The experimental NRTI was administered to an Electrician's Mate (EM), a Gunner's Mate (GM), an Electronics Technician (ET), and a Boatswain's Mate (BM) to determine whether or not personnel would be able to respond to information displays as generic displays by ignoring the specific content.

Table 4 presents the results for the responses to the "frequency of use" question for the four Navy personnel. Some indications of the degree to which the four respondents ignored the display's content can be obtained by comparing the pattern of responses with the person's rating and with the content of the displays he reported using. (It should be recalled that an attempt was made to use display types of three levels of complexity.) Looking at the fact-finding/text ratings, we see that the ET and EM personnel said they used all three samples of texts. The BM reported that he used no texts for fact-finding, but he did report using figures similar to examples in the inventory. In this case, both of those displays dealt with content of special relevance to Boatswain's Mates: one with fire hoses on ships; the other, with rigging. A similar situation seems likely in the case of the GM who reported using only a certain text for fact-finding which, incidentally, contained information about weapons. Both the GM and BM probably were responding to some degree to the content of the display and not to the generic type alone, while the ET and EM appeared to be responding only to the abstract category represented by the display.

The considerable variation shown in frequency ratings for the four men indicates that the use of the frequency rating with the inventory does result in differential response patterns, at least among individuals. Whether or not differential patterns would emerge for different Navy ratings remains to be determined through a large-scale survey.

The distribution of responses to the frequency categories is as follows:

1. 1 to 3 times a year--9 percent.
2. 1 time each month--17 percent.
3. 2 to 3 times a month--10 percent.
4. 1 or more times each week--28 percent.
5. Daily--9 percent.

A "0" rating (never) was assigned to 32 percent of the reading tasks. Note that some 37 percent of the tasks were rated as being performed either daily or one or more times each week.

Table 4

Frequency of Usage Results from Exploratory Study of NRTI

Display Type		Navy Rating									
		ET		EM		GM		BM		Combined	
		FF	FD	FF	FD	FF	FD	FF	FD	FF	FD
Table of Contents		4	--	4	--	4	--	0	--	3.0	--
Index		4	--	4	--	2	--	1	--	2.8	--
Text	Easy	3	3	3	5	0	0	0	0	1.5	2.0
	Medium	1	1	4	4	5	0	0	0	2.4	1.3
	Difficult	2	2	4	5	0	0	0	4	1.5	2.8
Figure	Easy	3	2	5	5	4	2	2	4	3.5	3.3
	Medium	2	1	4	4	0	0	0	4	1.5	2.3
	Difficult	3	2	4	4	0	0	4	4	2.8	2.5
Table	Easy	--	3	5	4	5	0	0	1	3.3	2.0
	Medium	3	2	4	5	0	0	0	0	1.8	1.8
	Difficult	2	1	4	4	0	0	0	0	1.5	1.3
Text & Figure	Easy	3	2	4	4	0	0	1	3	2.0	2.3
	Medium	3	1	4	4	5	0	0	4	3.0	2.3
	Difficult	2	2	4	4	0	0	0	0	1.5	1.5
Text & Table	Easy	0	2	4	4	1	0	0	0	1.3	1.5
	Medium	2	2	4	4	0	0	2	3	2.0	2.3
	Difficult	1	1	4	4	3	3	5	5	3.3	3.3

Note: Rating scale alternatives were coded as follows:

1. 1 to 3 times a year.
2. 1 time each month.
3. 2 to 3 times a month.
4. 1 or more times each week.
5. Daily.

A "0" rating indicates that the respondent does not perform this type of reading task.

Results of the ratings of consequences of reading task errors are given in Table 5. These data indicate that, as with the frequency ratings, a wide dispersion of responses is obtainable using the consequences scale. The most frequently estimated consequence was injury to self or others (7), and it occurred most frequently with the figures display.

The distribution of responses to consequence categories is as follows:

1. No consequence--11 percent.
2. Disciplined; some time wasted--10 percent.
3. Job done over; some time wasted--13 percent.
4. Job done over; materials wasted--5 percent.
5. Job done over; people inconvenienced--3 percent.
6. Equipment damaged or lost--5 percent.
7. Injury to self or others--25 percent.

A "0" (do not perform) was indicated for 32 percent of the examples.

As shown, the major consequence of categories 2, 3, and 5 above is the loss of time; of categories 4 and 6, the loss of material/equipment; and 7, harm to personnel. Using these consequences as criticality indices, reading errors leading to loss of time would be least critical; to loss of material/equipment, medium critical; and harm to personnel, most critical. Following this thinking, then responses of 2, 3, and 5 can be assigned a value of 1; of 4 and 6, a value of 2; and of 7, a value of 3. These values will be used later in discussing how the criticality information may be used to estimate the reading demands of Navy ratings.

Table 5

Consequence Rating Results from Exploratory Study of NRTI

Display Type		Navy Rating							
		ET		EM		GM		BM	
		FF	FD	FF	FD	FF	FD	FF	FD
Table of Contents		2	--	2	--	7	--	0	--
Index		2	--	2	--	7	--	1	--
Text	Easy	1	6	2	7	0	0	0	0
	Medium	1	7	2	7	7	0	0	0
	Difficult	1	3	3	3	0	0	0	3
Figure	Easy	7	6	4	7	5	6	3	7
	Medium	1	3	7	7	0	0	0	7
	Difficult	7	3	3	7	0	0	7	7
Table	Easy	1	3	4	2	7	0	0	3
	Medium	5	6	7	7	0	0	0	0
	Difficult	7	1	7	7	0	0	0	0
Text & Figure	Easy	3	7	3	4	0	0	4	4
	Medium	3	4	7	3	7	0	0	3
	Difficult	7	7	7	7	0	0	0	0
Text & Table	Easy	0	5	3	2	1	0	0	0
	Medium	7	7	2	2	0	0	6	6
	Difficult	1	1	2	2	1	1	1	1

Note: Rating scale alternatives were coded as follows:

1. No consequence.
2. I would be disciplined and some time would be wasted.
3. The job would have to be done over again and some time would be wasted.
4. The job would have to be done over again and some material would be wasted.
5. The job would have to be done over again and some people would be inconvenienced.
6. Equipment would be damaged or lost.
7. I might be injured or other personnel might be injured.

A "0" rating indicates that the respondent does not perform this type of reading task.

Development of the NRTT. Development of the Navy Reading Task Test (NRTT) consisted of writing questions for the display types used in the Navy Reading Task Inventory (NRTI) (i.e., the five types identified plus the Table of Contents and Index). Using the examples of each display type from the inventory (i.e., easy, medium, and difficult), three forms of the NRTT were constructed on the basis of judged complexity. These tests were labeled Forms E, M, and D to reflect their estimated difficulty level.

The forms comprise 16 questions. The first six questions of each form are identical--three concerned with the Table of Contents; and three, with the Index. Those questions are designed to test the student's search/locate skills. The remaining ten questions--five requiring fact-finding (FF) skills and five, following directions (FD) skills--differ for each NRTT form. The FF and FD sets of questions were designed so that one question from each set requires the use of one of the five identified display types (i.e., text, figure, table, text and figure, text and table). The development of these questions was based on a conceptual analysis of the reading task differences between looking for a specific piece of information to complete a task that one already knows how to perform (FF skill) and looking for information that tells one how to perform a task (FD skills). Essentially, the difference is in the type of knowledge the person has before he starts the reading task--what he actually does with text, figures, etc. in performing the task may be basically the same in either case. Although both FF and FD questions involve the location of facts, following directions usually consists of finding out "what to do next." Since the distinction between FF and FD material is not always clear, the FD items in all three forms involve (1) the statement of a task the person is performing, (2) a listing of one or more steps the person has taken, and (3) a question about what to do next.

Appendix A includes (1) instructions and sample questions provided to testees, (2) test items included in NRTT Forms E, M, and D, and (3) the correct answer for each item. As shown, for both FF and FD items (items 7 through 16 on all forms), data was provided as to the type of display involved and the page in The Bluejackets' Manual where the information could be found (e.g., "Text and Table, 206" for item 11, Form E, Page A-7).

Appendix B presents plates containing the following:

1. Test items included in Forms E, M, and D, juxtaposed with materials from The Bluejackets' Manual testees were to use to answer the item.

2. Table showing the percentage of personnel at each RGL (6 through 14) who got the correct answer to each item. These results were used in scaling the NRTT items for difficulty--see section below.

3. Table showing the frequency of performance estimates by one job incumbent in each of four Navy ratings.

Scaling the NRTT Items for Difficulty

The scaling was accomplished by administering the three forms of the NRTT to 247 Navy trainees undergoing recruit training at San Diego,

California. All trainees brought their own copies of The Bluejackets' Manual to the testing session to be used in taking the NRTT. In addition to the NRTT, trainees were also administered the Comprehension section of Form B of the Nelson-Denny (ND) Reading Test (1960). This test, which was selected because it had been used previously in Navy studies of the reading skills of A School personnel (Aiken, Duffy, & Nugent, 1976), provides tables for converting raw scores to reading grade level scores over the range from 7.2 to 14.0. For the purposes of the present study, the lower end of the grade level conversion table was extrapolated downward to grade 6.0.

Testing time for the NRTT was 45 minutes, which appeared to be sufficient for everyone to complete the test. This was indicated both by observations during the test session, and by the very low rate of omissions of questions coming near the end of the test.

Testing time for the ND, on the other hand, which was 20 minutes, was clearly not sufficient for many of the trainees, as indicated by the large number of omissions in the second half of the 36-item test. This is consistent with the design of the ND which, unlike the NRTT, emphasizes speed rather than power.

Results of the ND testing are summarized in Table 6. The median reading grade level of this sample is at the 10th grade level, which is consistent with data reported by Duffy (1976), using a different standardized reading test.

Table 6

Frequency Distribution of Nelson-Denny RGLs of Navy Recruits

Reading Grade Level	N	Frequency (%)	Cumulative (%)
6	26	11	11
7	26	11	22
8	21	9	31
9	25	10	41
10	41	17	58
11	14	6	64
12	28	11	75
13	16	6	81
14	50	19	100
TOTAL	247	100	100

Table 7 presents the summary statistics for the three forms of the NRTT for each reading grade level grouping on the ND. It should be recalled that each form of the NRTT has a total of 16 possible points. The data indicate that, in terms of total scores, Form E was, as planned, the least difficult of the three forms. However, Forms M and D are not noticeably different in overall difficulty.

As shown in Table 7, considering the three NRTT forms together, across all grade levels, the percent of correct scores ranges from 58 to 94 percent. Thus, even the poorest readers (6th grade level) were able to perform over half of the reading tasks on the more difficult forms. Overall, the rate of omissions dropped from 8 percent across the three forms for 6th grade level readers to less than 1 percent for 10th grade level readers and beyond. Thus, most people attempted all items.

The correlations for the Nelson-Denny reading test with the NRTT Forms E, M, and D were .53, .41, and .54, respectively. These somewhat low Pearson r's reflect both the fairly high success rate on the three NRTT forms and the fact that a speed test is being correlated with a power test. If the time limits for the NRTT were decreased, the rate of information processing could be used to further discriminate among trainees. Under this arrangement, an increase in the size of the correlation coefficients for the NRTT and ND tests would be expected.

Tables 8, 9, and 10 show the proportions of the total sample and of each general RGL who correctly answered each item on each NRTT form. As shown in Table 8, on Form E, only two items--13 and 16--had overall accuracy rates of below 79 percent. Item 13 required respondents to study a figure to determine two steps that must be performed. Errors on this item were primarily due to omission of one step. Errors on item 16 were primarily errors of commission; that is, in entering the wrong answer in the space provided. In both cases, however, responses were taken from the correct source. Thus, although only 40 percent of the 6th grade level readers got item 16 of Form E correct, 90 percent of them were able to read/interpret the situation part of the question and the question itself and to locate the specific material in The Bluejackets' Manual to be used to answer the question. However, they were unable to extract/enter the appropriate information needed.

Of the seven items on Form M with accuracy rates below 80 percent, one--#3--is a Table of Contents item that also occurs on Forms E and D. Because accuracy rates are above 80 percent for this same item on Forms E and D, the 70 percent accuracy rate of Form M is suspect. Finally, nine items on Form D had accuracy rates below 80 percent, confirming it as the most difficult form. However, on an item-by-item basis, there is a mixture of difficulty levels among and within the three forms. In subsequent research, these items could be reassembled into one or two forms having a more uniform difficulty level.

Table 7

Results of NRTT and Nelson-Denny Testing

ND RGL	NRTT Form	N	Mean	Median	Standard Deviation	Percent Correct
6	E	10	10.5	11.5	3.6	70
	M	6	9.2	9.5	2.0	58
	D	10	9.3	8.5	2.9	58
7	E	8	11.3	11.0	1.7	75
	M	10	11.0	11.0	2.3	69
	D	8	10.4	11.0	2.5	65
8	E	7	12.7	13.0	1.2	85
	M	5	11.2	12.0	1.3	70
	D	9	11.6	11.0	1.2	73
9	E	8	13.0	13.0	0.5	87
	M	9	12.7	13.0	1.7	79
	D	8	9.8	10.0	3.1	61
10	E	11	13.2	13.0	1.2	88
	M	19	12.8	13.0	1.9	80
	D	11	12.4	13.0	1.6	78
11	E	8	12.9	13.0	1.6	86
	M	3	12.0	12.0	1.0	75
	D	3	12.3	12.0	0.6	77
12	E	7	13.0	13.0	1.2	87
	M	6	12.5	12.0	1.8	78
	D	15	12.5	13.0	2.1	78
13	E	6	13.8	13.5	0.9	92
	M	5	11.2	12.0	2.5	70
	D	5	13.2	13.0	1.8	83
14	E	17	14.1	14.0	1.0	94
	M	18	13.4	13.0	1.3	84
	D	15	13.5	13.0	1.4	83

Table 8

Percent of Personnel Getting Each Item Correct on the Experimental Navy Reading Task Test (Form E)

Task/ Material	Item	General Reading Grade Level of Personnel									Total
		6	7	8	9	10	11	12	13	14	
Table of Contents	1	80	100	86	100	91	100	100	100	100	95
	2	70	100	100	100	100	88	100	100	94	94
	3	80	75	100	88	82	75	71	100	88	84
Index	4	80	75	86	100	100	88	100	100	100	93
	5	90	62	86	88	91	88	100	83	100	89
	6	50	75	86	88	82	100	100	100	100	87
Finding Facts Using:											
Texts	7	60	62	71	88	91	62	57	100	100	79
Figures	8	80	50	71	62	91	75	86	83	94	79
Tables	9	90	100	100	100	100	88	100	100	100	98
Text & Figure	10	90	88	100	100	100	100	100	100	94	96
Text & Table	11[a]										
Following Directions Using:											
Texts	12	70	88	100	88	91	100	86	83	100	90
Figures	13	20	25	14	38	55	62	57	67	59	45
Tables	14	90	100	100	100	91	100	86	83	100	95
Text & Figure	15	60	75	86	100	100	100	86	100	94	89
Text & Table	16	40	50	86	62	55	62	71	83	82	66
N		10	8	7	8	11	8	7	6	17	82

[a]This item was deleted from the test.

Table 9

Percent of Personnel Getting Each Item Correct on the Experimental Navy Reading Task Test (Form M)

Task/ Material	Item	General Reading Grade Level of Personnel									Total
		6	7	8	9	10	11	12	13	14	
Table of Contents	1	100	90	100	100	95	100	83	80	100	95
	2	50	90	80	100	95	67	100	80	94	89
	3	33	60	80	78	74	67	67	80	78	70
Index	4	83	90	80	78	100	100	100	80	100	93
	5	50	90	80	89	95	100	83	80	100	89
	6	50	80	100	89	95	100	83	80	100	89
Finding Facts Using:											
Texts	7	100	90	100	100	100	100	83	100	100	98
Figures	8	50	40	60	56	68	33	50	20	56	53
Tables	9	83	90	100	100	95	100	100	100	100	96
Text & Figure	10	33	50	0	89	47	33	50	60	56	51
Text & Table	11	83	90	100	89	89	67	100	100	100	93
Following Directions Using:											
Texts	12	50	90	80	89	84	100	83	100	89	85
Figures	13	33	10	20	44	63	67	67	20	56	46
Tables	14	67	50	40	67	79	100	67	60	72	68
Text & Figure	15	33	60	80	67	84	67	100	80	83	75
Text & Table	15	33	60	80	67	84	67	100	80	83	75
N		6	10	5	9	19	3	6	5	18	81

Table 10

Percent of Personnel Getting Each Item Correct on the Experimental Navy Reading Task Test (Form D)

Task/ Material	Item	General Reading Grade Level of Personnel									Total
		6	7	8	9	10	11	12	13	14	
Table of Contents	1	70	88	100	75	90	100	100	100	100	92
	2	90	88	100	75	82	33	87	100	73	83
	3	100	38	89	50	91	100	87	100	80	81
Index	4	100	100	100	75	100	100	100	100	93	96
	5	100	100	89	50	72	100	87	80	93	81
	6	80	75	89	88	91	100	93	80	93	88
Finding Facts Using:											
Texts	7	10	63	67	38	100	100	93	100	100	75
Figures	8	60	50	56	75	82	67	73	80	93	73
Tables	9	70	88	67	50	72	100	53	60	60	64
Text & Figure	10	40	75	78	75	91	100	60	80	93	75
Text & Table	11	30	50	67	75	64	100	80	60	87	68
Following Directions Using:											
Texts	12	40	38	78	50	73	100	87	100	100	74
Figures	13	20	50	22	50	27	0	20	80	40	33
Tables	14	20	38	22	38	46	0	80	80	67	49
Text & Figure	15	30	38	56	63	55	33	67	40	67	54
Text & Table	16	70	63	78	50	100	100	87	80	87	80
N		10	8	9	8	11	3	15	5	15	84

Overall, on the three forms of the NRTT, there are 36 different items (3 TOC, 3 Index, 15 fact-finding, and 15 following directions). Of these, 17 or 47 percent, had an accuracy rate of less than 79 to 80 percent correct. Of those, 10, about 60 percent, were following directions items, suggesting that the additional information processing involved in many of the FD items, which render them more like "problem solving" items, makes them more difficult to answer correctly.

The relationship of general reading ability to performance on the NRTT items is illustrated in Figure 4, which shows that for the 48 reading tasks attempted by 6th grade level readers on the three NRTT forms, 42 percent of the tasks had accuracy rates equal to or less than 50 percent. The proportion of reading tasks having this accuracy rate decreased to a low of 6 percent averaged over the 12th, 13th, and 14th reading grade levels. Thus, the probability that more than half of the people at a reading grade level will be able to perform a given Navy reading task shows a seven-fold decrease from the 12th to 14th grade level to the 6th grade level.

With the data on general RGL ability and on performance on the Navy reading tasks given in Tables 8, 9, and 10, it is possible to determine the proportion of people at various general RGLs who can successfully complete each Navy reading task test item. For instance, we can see that 40 percent of 6th grade level readers can successfully complete item 10 of Form D (Table 10), compared to 93 percent of 14th grade level readers.

To establish the reading difficulty level of a given Navy reading task, a judgment must be made concerning the proportion of men at a given general RGL who must be able to perform that task. In general, as indicated in Figure 4, the higher the proportion of people whom the Navy would like to be able to perform a given reading task, the higher the general RGL of ability needed. For instance, if it is desired that 93 percent of personnel are able to do the task described in item 10 of Form D, this will require a 14th grade level of general literacy. If it is desired that 40 percent of personnel perform the reading task, this criterion will be met by people having a 6th grade level of literacy. Since the actual stringency of the criterion level may reflect the nature of the reading task and its frequency and/or criticality, the criterion levels of performance for each reading task must be established in consultation with job supervisors and job performers. It should be recalled that the Navy Reading Task Inventory for supervisors calls for a judgment of the percentage of personnel in the supervisor's rating that must be able to perform each type of Navy reading task represented in the NRTI.

Once this percentage criterion is established, it is a simple matter to examine Tables 8, 9, and 10, results for Forms E, M, and D of the NRTT, to determine the lowest general RGL at which the criterion is achieved for a given reading task, which then becomes the reading difficulty level of that task.

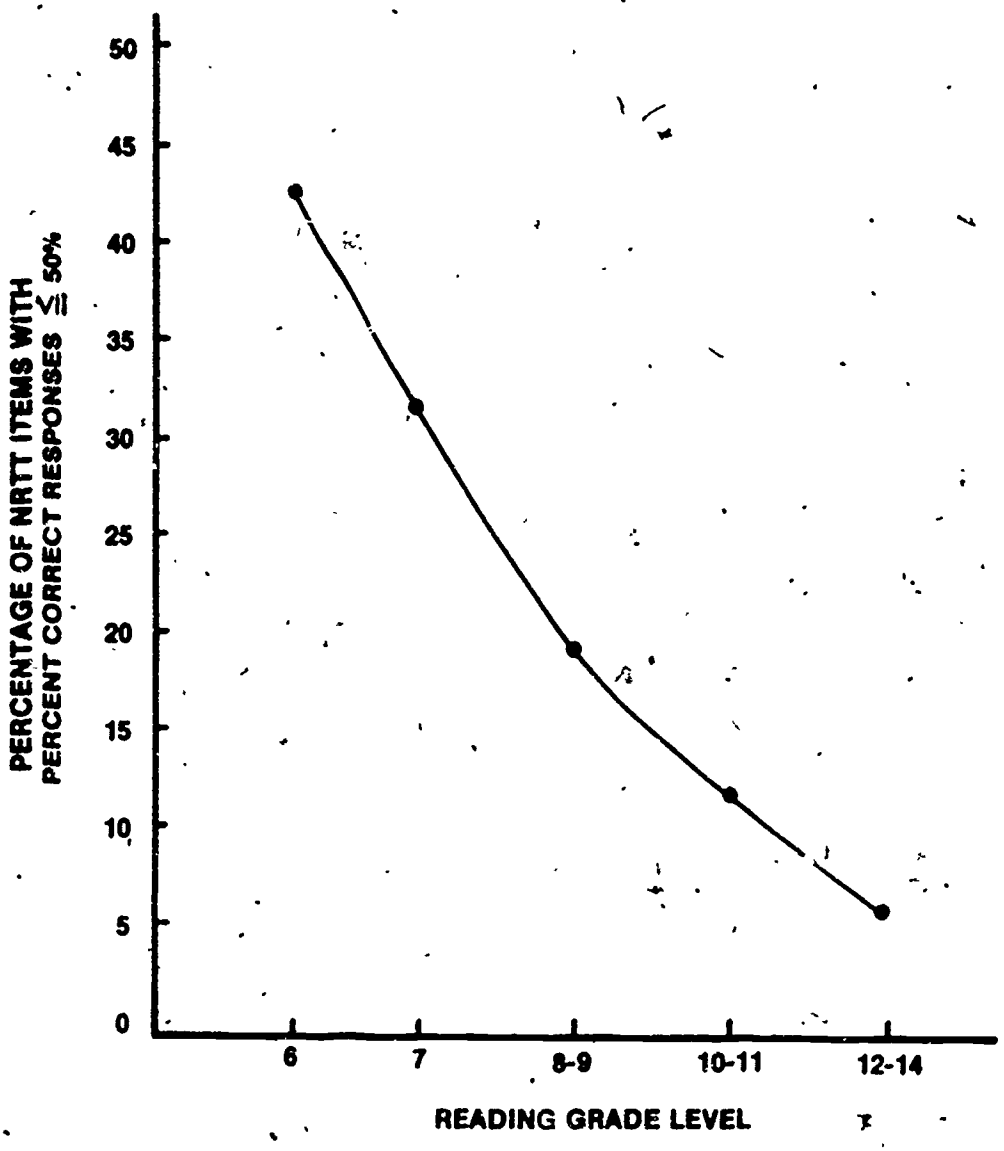

Figure 4. Percentage of NRTT items for which correct responses were obtained by 50 percent or less of the people at a given RGL on the Nelson-Denny test.

Establishing Reading Requirements for Navy Ratings

Reading requirements for Navy ratings are established by combining the information about the reading difficulty level of Navy reading tasks with the data on the frequency and criticality of reading tasks obtained with the NRTI so as to assign more weight to those reading tasks of greater frequency and criticality. If all tasks are equally frequent and critical, the RGL will simply be the average of the item RGLs for the percent passing specified by the supervisor.

To illustrate the procedure involved in using the frequency and criticality information and the RGL of Navy reading tasks for determining the general reading requirement of a Navy rating, the fictitious data of Table 11 will be used. This table shows three reading tasks that were cited as being performed on the job (by one or more persons). The first task (Fact-Finding, using texts as represented on Form E, NRTT), is performed daily (F = 5), and an error results in a loss of time (C = 1). Supervisors have indicated that 80 percent of the people need to be able to do this type of reading task. Table 11 shows that on Form E, Fact-Finding using Texts, it is at the 9th grade reading level that we first find at least 80 percent of the people performing the task accurately. Thus, the task is assigned an RGL of 9. Following this same procedure, the data for the Fact-Finding/Figures and Tables tasks are obtained.

Table 11

Hypothetical Data for Illustrating How Reading Grade Levels Are Determined for Navy Ratings

Navy Reading Task	Frequency (F)	Criticality (C)	Reading Grade Level (X)
Fact Finding Using: (Form E)			
Texts	5	1	9
Figures	3	2	6
Tables	2	3	6

To compute the reading grade level for a rating, the formula shown below is used. This formula involves adding the frequency and criticality of scores for each reading task and then multiplying the RGL of the task by the sum of the frequency and criticality scores. Then, the sum of each of the products resulting from the preceding operation is obtained. Next, all the frequency and criticality scores are added to obtain an overall total for these scores. This total is then divided into the preceding sum, and the result is the RGL of the rating, weighted by the frequency and criticality of the reading tasks. In the example shown below, the RGL for the rating is 7.1.

$$RGL_{Rating} = \frac{[(F + C)\ X_1] + [(F + C)\ X_2] + \ldots [(F + C)\ X_n]}{[(F + C)_{X_1} + (F + C)_{X_2} + \ldots (F + C)_{X_n}]}$$

$$= \frac{[(5 + 1)9] + [(3 + 2)6] + [(2 + 3)6]}{[(5 + 1) + (3 + 2) + (2 + 3)]}$$

$$= \frac{54 + 30 + 30}{16} = \frac{114}{16}$$

$$RGL = 7.1$$

Following this general approach, with the NRTI, one obtains an indication of the types of reading tasks Navy personnel perform and the frequency and criticality of these tasks. Used in conjunction with the expectancy tables that show the proportion of personnel at different reading levels who perform Navy reading tasks correctly, it is possible to calculate the general RGL of Navy ratings.

Critique of the NRTI/T

The materials and procedures described in this section for determining the reading tasks performed in Navy ratings and the general level of reading skills required by these raters must be considered of an experimental nature. First, only four Navy job performers (EM, GM, ET, and BM) were administered the NRTI, none of whom was a supervisor. For the GM and BM, there was some indication that they were responding to some degree to the content of the display and not to the generic type of task alone. Further research to develop instructions or brief training periods for helping people to better understand the nature of the task might help remedy this problem.

Second, there is no evidence to suggest that the three samples of display type (texts, figures, etc.) in the NRTI actually represent different levels of complexity or that they were responded to on this basis. Indeed, there is evidence to the contrary. The last item of each NRTI displayed three passages of materials that had been previously scaled for difficulty in the development of a readability formula (Sticht, 1975b). The four testees were asked to read all three passages and rate them as to their difficulty. Since only one rater agreed with the original scaling, it seems unlikely that the testees were sensitive to differences in complexity in the three samples for each display type as they completed the NRTI, especially since they were not instructed to attend to the display complexity. Further, it is neither certain that the displays are, in fact, of different complexity levels (even though they were judged as such by the NRTI developer) nor that the dimension of complexity was tapped in the NRTT and contributed to the difficulty of the NRTT items. In the latter case, the difficulty may have resided in the questions rather than the materials or in a combination of the materials and questions.

Despite initial editing, some NRTT items still remain ambiguous and permit a wide range of responses that might be considered correct. This is especially true for the following directions questions. These questions should be more carefully drafted so that (1) in the situation component, the reader is led mentally through steps of a process, and (2) the question is then posed as to what step or steps must be performed next to reach the desired outcome. In Appendix A, Item 15 of NRTT Form M (page A-10) illustrates this approach fairly well, although the open-ended response format still permits a variety of responses that require some judgment for scoring. This latter problem could be resolved by using carefully designed multiple-choice questions.

Determining whether use of the NRTI/T presents a valid estimate of the reading demands of Navy jobs is a most serious problem. It may be easier to know that an approach is not valid than to know that one is. For instance, a variety of methods for determining reading demands of jobs was reviewed earlier. The readability method is an empirical method that can be performed by clerks or computers. However, the question of validity seems clear with the readability approach: It in no way involves figures and tables in the estimate; and, as we found in the structured interview (Sticht et al., 1977), only 32 percent of the reported reading tasks involved texts only while 62 percent used figures or figures and texts combined. Thus, simply on the basis of the information displays involved, the readability formula approach does not appear to validly represent Navy reading tasks.

As mentioned on page 12, the structured interview produced over 320 specific job tasks in which reading subtasks were performed. Perhaps the most valid estimate of the reading difficulty level of Navy ratings would be obtained by having personnel of various reading levels perform the actual job tasks and reading subtasks that were reported to have been performed. These items could then be scaled for difficulty as in the present study if a "proper" scoring system were available. Completion of the job task might be scored but perhaps some could be completed even though some or all of the reading material was not understood. There is no way one can know this. Similarly, the importance of reading speed depends on a number of situational factors; thus, the relative importance of a speed score cannot be specified for the general case. Finally, the options for determining reliability raised a whole new set of problems.

From all this, it should be apparent that there is no such empirical "thing" or "stuff" or "event" or "condition" known as "the reading demands of a job." Reading demands are not discovered, they are created by procedures that are more or less systematic and performed according to more or less specifiable rules. Thus, the question of the validity of any estimate can only be answered in respect to a model or theory of job-related reading that would define systematic procedures for obtaining estimates of reading demands of jobs for various purposes permitted by the theoretical constructs involved. In this regard, a general model for a specific job reading task was developed in the Sticht et al. (1977) study of the role of reading. The specific job shown consists of a number of steps. With each step, there is an implicit question: Do I know how to do the next step? If the answer is yes, the person proceeds through that step to the next one. If no, he

performs a subtask involving a general operation call "read," which acts on a data base called "material." Information is extracted by the "read/material" routine until the job task step can be performed, and the person proceeds through the task. Although this model defines a job reading task so that the goal of obtaining samples of such tasks is readily achievable, ignorance of the size and composition of the domain of reading tasks leaves open the question of the validity/representativeness of the sample.

Although this model is useful for collecting samples of reading tasks, it is not so useful for developing reading task tests. In this case, a theory or model is needed for constructing reading tests that can be applied to the sample of reading tasks. However, to be certain that these reading tests match the information processing that was done in the actual performance of the reading task on the job, the theoretical constructs in the reading test model must be incorporated into the interviews or other approaches used to obtain the sample of reading tasks. Thus, it is necessary to query people about their information processing during the performance of a reading task, in order to discover whether or not they perform the types of information processing involved in the model of reading. This was the approach taken in the Sticht et al. (1977) study of the role of reading in the Navy. As indicated on page 12, the 186 reading-to-do tasks obtained in this study were used in the development of the NRTI/T since they represented 75 percent of the types of reading tasks job performers reported.

The construction of the NRTI introduced a host of new conceptual/procedural problems. For instance, is it possible for people to rate their performance of generic reading tasks, when all the NRTI can present is a number of specific displays (texts, figures, tables, etc.) with their specific content and (unspecified) dimensions of complexity, legibility, etc.? Although the Canadian study (Smith, 1975) has presented numerous displays that people used as generic displays (even though each display was a "species" of the "genus"), that study did not have any way to determine the extent to which a genus versus a species basic accounted for people's judgments. In the present study, responses to the NRTI by the four job performers contained evidence to suggest that people may not respond to the genus aspect of a species display but, rather, to the content of the latter.

In addition, responding to information displays with a simple "yes, I read things like that" or "No, I do not read things like that" does not define a task, because the term "read" is not defined. However, since figures and tables are considered to be "read," a general definition like "extracting information from visual displays" may be necessary. The problem with this definition is that extraction of information can go on at various levels. For instance, one can extract information about the kind of type (pica?) used and the color of the ink--or one can extract information useful for constructing ideas represented by the message encoded in the printed display. If the latter is the goal, it is necessary to know what type of information is being sought, for what types of ideas, and with what type of given display.

For the above reasons, an attempt was made to determine (1) what kinds of generic displays (texts, figures, etc.) people read and (2) whether or not they used these displays to seek two generic types of information. These two types are specific data for accomplishing a task (fact finding)

and specific information about what to do next (following directions). However, since we have little evidence that these various distinctions entered into people's judgments when completing the NRTI, we cannot be certain that the NRTI validly represents our conceptual distinctions--whether or not the latter are useful ways of thinking about job reading tasks.

Finally, the question of scaling the NRTI items for difficulty imposes the additional problems of how to formulate fact finding and following directions questions. Some of the problems involved in this endeavor were discussed above. Suffice it to say that a better conception of the distinction between fact finding and following directions question seems desirable to determine whether or not any major differences in information processing exist between these activities, and, if so, whether items can be written to separately evaluate these differences. Beyond this, problems of drawing inferences about a generic type of item from a specimen of that item still remain.

It should be pointed out that the foregoing problems are not specific to the determination of job reading requirements. Indeed, they permeate all aspects of job and task analysis and all psychometric approaches to the evaluation of skills and knowledges in any domain of activities. Within these limits, it is believed that the NRTI/T procedures described herein can, with further refinement, be usefully applied to the assessment of the reading demands of Navy ratings, so that job-related reading curricula and objectives can be more meaningfully conceived.

SURVEY OF THE NAVY'S TRAINING SYSTEMS

To build a more responsive career development system, it is necessary to understand the components of the subsystems to be integrated, and to identify any existing formal or informal linkages between these subsystems that might be used to facilitate the integration of job skills and literacy skills training. Therefore, this section will briefly describe the Navy's current Job Skills Training, General Education, and Career Counseling Systems.

Information concerning these career development subsystems was obtained via site visits to Navy Training Centers, interviews with cognizant Navy and civilian training personnel, and review of relevant Navy and civilian literature.

Job Skills Training System

The Navy's Job Skills Training System, illustrated on the left side of Figure 5, is designed to receive relatively unskilled civilian personnel and to train them to become competent job performers within a short time period. This allows the Navy to maintain a constant manpower level both on shore and in the fleet.

Nature of the Training and Its Components

Briefly, Navy enlisted personnel are selected into the Navy based on the results of the mental and physical examinations administered at the Armed Forces Entrance and Examination Station (AFEES). Upon induction, these personnel proceed through a series of training programs, Recruit Training, and Basic Technical (Class A) School or Apprenticeship training, before being assigned to their first tour of sea duty. During their initial job assignment, new personnel receive on-the-job training under the direction of their work supervisor, as part of their regular work assignments. After an individual has mastered the entry level jobs in his rating, he is eligible for advanced job training, generally provided as a reenlistment incentive by the Navy. Upon completion of that training, he is again returned to the regular work force and continues in the training/work cycle until career termination.

Reading Demands of System Activities

A major reason for studying the job skills training system is to identify areas in which reading requirements, as imposed by some career activity, might act as a barrier to career advancement. Thus, relevant Navy policy and training documents, describing both the resident and nonresident training programs, as well as any formal advancement requirements, were reviewed. The Navy's Manual of Qualifications for Advancement (NAVPERS 18068) was of special value in this regard. This review indicated that, with the exception of E-2, all rate advancement stages have substantial reading requirements. In fact, as soon as a person applies to enter the Navy, he is faced with a very heavy literacy skill requirement in the form of the aptitude testing, which occurs at the AFEES. Since most aptitude tests are paper-and-pencil tests, the person's reading ability (literacy skills) has a direct affect on his ability to demonstrate his true aptitude. His performance on these tests has a lasting importance, in that the scores obtained are used to determine his initial career and job training assignment, as well as his future career and training assignments.

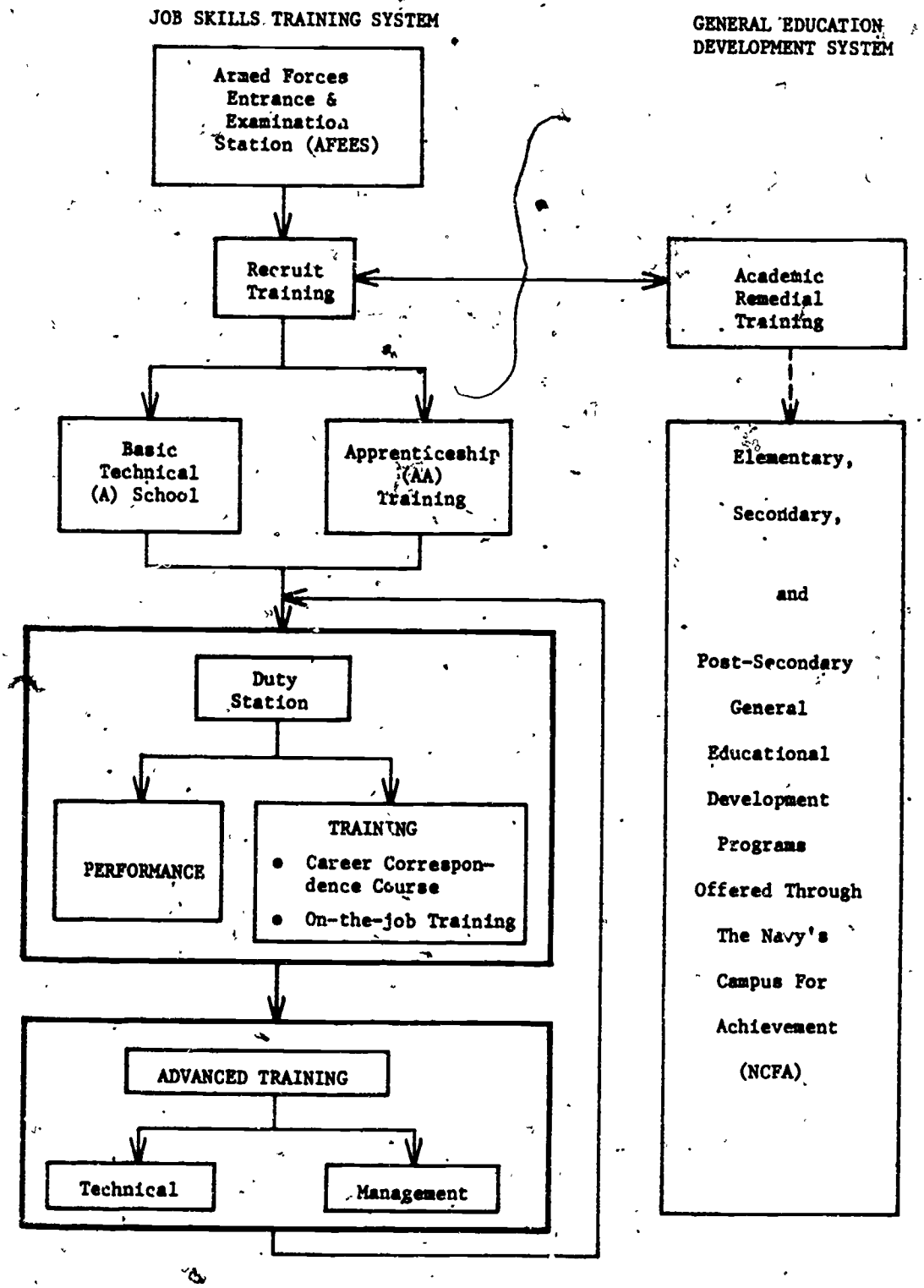

Figure 5. Relationship between the Job Skills Training and GED Systems.

Resident Training Activities. In his first formal Navy assignment, Recruit Training (RT), the new recruit again faces a literacy skills requirement in the dual form of taking lecture notes and studying (reading) them, and studying the Basic Military Requirements Manual and Bluejackets' Manual in preparation for taking the four paper-and-pencil multiple-choice tests administered in RT. In order to successfully complete RT, he must meet a specified percent correct standard on each test. Sticht et al. (1977) found that 35 percent of the job performers and 5 percent of the students reported experiencing some reading problems in RT. Since the job performers are recalling their RT experiences, while the students are reporting immediate RT experience, the students' judgment should probably be considered as more valid; hence, it would seem that the reading demands are not particularly heavy for this career activity.

Despite the fact that only 5 percent of the students reported experiencing reading problems in RT, this is the only point in the training pipeline where literacy training is formally required for Navy personnel. Thus, it would seem that either the literacy load in RT is perceived as being substantial, or that this literacy training is perceived as preparation not only for RT, but for the next phase in the recruit's training. The latter may be the case, since neither the recruit nor the students in Class A or Apprenticeship schools have any other opportunity to acquire literacy training.

Upon successful completion of RT, the recruit is assigned to either A school, initial job skills training, or to apprenticeship training in one of four rates: Airman, Constructionman, Fireman, or Seaman. In any case, the student is again faced with the need to use his literacy skills to successfully complete this stage of his formal training. From observation of the Seaman apprenticeship school and specified A schools, the research staff observed that both types of schools tended to rely heavily on the lecture/note-taking/text-reading/written-test-taking procedures of training. It was also observed that the materials and academic load is heavier in the A schools than in the apprenticeship schools. This observation is supported by the Navy's policy of generally sending only its more qualified, better aptitude personnel to the A schools, with the apprenticeship schools usually receiving the other personnel. In any case, the training at this stage of a person's career relies heavily upon the person's ability to obtain and demonstrate his attainment of knowledge through the use of his literacy skills. This conclusion is reinforced by the fact that some 56 percent of the students interviewed by Sticht et al. (1977) reported having some problems understanding (reading) the materials used in Class A school programs. Overall, 36 percent of all the personnel interviewed reported reading problems with the A school training.

Nonresident Training Activities. Once an enlisted man is permanently assigned to a duty station, the next major literacy skill requirement, in reference to formal career advancement requirements, occurs either when he begins to prepare for advancement to the next rate level, or when he is sent for advanced training at a Class C school. The latter literacy load is probably very similar to that described above for the Class A schools in most cases. In reference to rate advancements, there is no formal literacy skill barrier for advancement to E-2. For advancement to E-3, A school graduates must complete the Basic Military Requirement (BMR) correspondence

course (i.e., read the text and answer the multiple-choice questions provided with the text). Students are required to meet a modest standard of number of correctly answered questions per section before being officially certified as having successfully completed the course. Apprenticeship graduates must take the same course under the same conditions, in addition to taking the correspondence course for their rate (i.e., Seaman, Fireman, Constructionman, or Airman). This course operates under the same guidance and standards as the BMR correspondence course. However, these students must take a written end-of-course test, either a locally constructed one or one available from the correspondence course center, in order to be officially certified as having successfully completed the course.

There are two major mandatory correspondence course requirements (literacy requirements) imposed on all Navy personnel for preparation for advancement to Petty Officer 3rd Class (E-4) and 2nd Class (E-5):

1. Military Requirements Correspondence Course (CC) for PO3 and PO2.

2. Rating specific 3 and 2 correspondence courses.

Both courses are composed of a rate training manual and a series of multiple-choice questions and follow the same administrative procedures described for the BMR CC. There is a separate Military Requirements CC for personnel advancing to E-4 and to E-5. However, the rating CC is a combined course for PO 3rd and 2nd Class, which is required to be formally completed only once. Apprenticeship graduates are required to take their specific rating PO3 and 2 CC in order to be eligible for advancement to E-4, while A school graduates are not required to take their specific rating CC until they are ready for advancement to E-5. After completing the CC requirements for advancement, all personnel must take a Navy-wide Military Leadership Exam and a Navy-wide exam in their specific rating for promotion to E-4 (PO3) and for promotion to E-5 (PO2). Both of these exams are paper-and-pencil tests.

For promotion to E-6 and E-7, the mandatory requirement consists of the PO1 and Chief CC, which need be taken only for the E-6 promotion, and the Navy-wide exam in the specific rating for E-6 and for E-7. Thus, the reading demands imposed by correspondence courses seem to be rather heavy; in this regard, over a third of the personnel interviewed reported having difficulty understanding the CC materials. In fact, 73 percent of the instructors (N = 11) indicated that they had difficulty with their CCs.

General Education Training System

Paralleling the job skills training system is the Navy's General Educational Development (GED) system, which is designed to provide Navy personnel with opportunities for personal growth and development in the areas of general education knowledges and skills. For present purposes, we may consider this system to be composed of two major components: (1) in-house literacy training programs (on-duty) and (2) off-duty general education programs. The latter is subdivided into two branches: (1) the Navy Campus for Achievement (NCFA) and (2) the Defense Activity for Non-Traditional Educational Support (DANTES). Before discussing the current

linkages between the GED system and the job skills training system, a brief description of the components of the GED system will be presented (see Figure 5).

In-House Literacy Training

One aspect of the Navy's GED system is the on-duty remedial reading training provided for selected Navy recruits during the early weeks of Recruit Training--the Academic Remedial Training (ART). This training, given at the Navy's three recruit training centers at Great Lakes, San Diego, and Orlando consists of short-term (maximum length is 8 weeks) training programs provided to assist marginally skilled personnel in coping with the minimum reading demands of Recruit Training. ART, the first general education training offered to Navy recruits, is provided by removing from RT those students identified as having marginal reading skills; i.e., reading below the 5.0 reading grade level. These selected students are sent to a short remedial reading program at the Recruit Training Center, upon completion of which they are returned to Recruit Training. Depending on the local ART regulations, nonsuccessful ART students can be recommended for discharge from the Navy.

Off-Duty Education

The Navy's off-duty education system is the Navy Campus for Achievement (NCFA) program. The NCFA, officially described by CNETINST 1560.3, (1975), is "the management system that coordinates all voluntary off-duty educational experiences and integrates them with on-duty programs . . . [so as to] contribute to the general academic and vocational development of all naval personnel" (p. I-1).

NFCA Objective. The formal objectives of the NCFA program are:

1. "To provide naval personnel with voluntary off-duty educational opportunities for career long-range needs of Navy, the nation, and themselves.

2. "To provide for the establishment of on-site off-duty educational services programs at every naval activity (ashore and afloat) encompassing a broad range of educational experiences including basic and remedial education; high school equivalency and/or high school diploma programs; associate, baccalaureate, and advanced degree programs; and vocational and technical programs.

3. "To maintain a network of professional educational advisors who provide unit commanders with technical guidance concerning educational programs and Navy personnel with educational and vocational counseling.

4. "To provide for the elimination of obstacles naval personnel face in the attainment of educational goals

such as residency requirements, non-transferability of credit, non-recognition of Navy on-duty education and training by civilian institutions, and reluctance by trade organizations to validate Navy job experiences."

(CNETINST 1560.3, 1975, pp I-2 & I-3)

NCFA Programs. The six basic programs included in the NCFA are listed below:

Program Name	Basic Purpose
NCFA Degree Program	Provide Post Secondary Educational Opportunities.
Instructor Hire Program	
Tuition Assistance Program	
Program for Afloat College Education (PACE)	
Veterans Administration Educational Assistance (GI Bill)	
Veterans Administration Educational Assistance--Predischarge Education Program (PREP)	Provide basic skill upgrade training to permit student to obtain GED or high school diploma.

DANTES Program and Objectives. NCFA also coordinates the DANTES program which has two major objectives:

1. "To provide credit-by-examination programs for military personnel through the Services voluntary education programs, and
2. "to prepare and distribute a catalog of independent study programs and courses available to servicemen and women."

This program is just getting started, but it too is geared towards providing post secondary assistance to Navy personnel. Thus, the major thrust for the Navy's General Education Development system is at the post secondary level, with only minor concern being given to programs like PREP and ART, which are concerned with assisting marginally skilled or educated personnel.

Linkages Between Job Skills Training and GED

Formal (Policy) Linkages

Currently, two linkages exist between the job skills training and GED systems in the form of official Navy literature. One of these linkages is between RT and the academic remedial (reading) training (ART) mentioned above. According to BUPERS, all personnel identified by RT instructional

or administrative personnel as having "severe, genuine difficulty with the mastery of presented subject matter because of literacy problems, . . . will be considered a candidate for remedial literacy training" (BUPERS letter 13 Sep 67, Pers-C21la-aor, Ser:C21/209). Formally stated, the objective of ART is to help recruits raise their reading ability to a reading grade level of approximately 5.0, as soon as possible.

Another formal linkage is mandated by NCFA policy, which requires that personnel receive educational counseling within 30 days of arrival at a new duty station. However, during conversations with NCFA staff, it was indicated that current NCFA staffing (including Education Service Officers) does not permit close adherence to this policy. Other than the NCFA policy and the RT/ART linkage, there seems to be no other formal Navy policy-imposed linkages between the job skills training and the GED systems.

This same relationship was examined in both the Army and Air Force systems to see if those services operate differently than the Navy. It was found that this same limited formal relationship also exists in the Army, where the only policy linkage is between the Army's entry level job skills training program and its literacy training program. The Army's Advanced Individual Training Preparatory Training (AITPT), Training and Doctrine Command Circular 621-1, requires that all Mental Category III and IV personnel with certain job assignments, who read below the 6.2 grade level, are to be given remedial reading training. The regulation also permits other personnel in trainee status to be assigned to the AITPT program on a space available basis. This training, with a maximum length of 6 weeks, is given just prior to job training so as to prepare marginally literate personnel to cope with the reading demands inherent in the job skills training. The program's objective is the attainment of a minimum 7.0 reading grade level in job-related reading.

In contrast to both the Army and the Navy, the Air Force has established two policy linkages between their job skills training and their GED training systems. The first, equivalent to the Navy's RT/ART, and to the Army's Job Training/AITPT linkages, is the Air Force regulation requiring all newly inducted Mental Category IV personnel reading below 6.0 to be given remedial reading training. The program, of 13 weeks maximum length, is given prior to basic military training and has the objective of having personnel attain a 6.0 reading grade level. The second formal linkage, created by Air Force Manual 50-23, is between-job skills upgrade training, given after an airman has been assigned to a permanent duty station, and remedial reading training. The regulation requires that all personnel with an Airman Qualifying Examination score or Airman Classification Battery general score of 50 or less, and who score below the 9.0 reading grade level on a standardized reading test, be enrolled in a reading improvement course concurrent with job skills upgrade training. (The latter is a correspondence course designed to prepare airmen for the next higher level of job skills and duties.) The regulation also permits other personnel, identified as having reading problems on the job, or in the upgrade training, to be assigned to the reading training program. The objective of the reading training is the achievement of a 9.0 reading grade level. Thus, the Air Force is the only one of the

three services that formally (i.e., through written regulations) provides a linkage between the job skills training and GED systems beyond the entry stages of a person's military career.

Informal (Content) Linkages

In addition to policy-based linkages, there is a question as to what extent content linkages exist between the job skills training and the GED training systems. That is, does the content of the various GED programs supplement, enhance, or otherwise directly relate to facilitating the Navy's job skills training programs? Examination of descriptive materials from DANTES and literature regarding the NCFA indicate that the GED and job skills training systems exist as separate and distinct entities with little or no attempt to interrelate their training objectives or their content. Basically, the Navy's job skills training has been designed to provide personnel with rating-specific information and skills, while the GED programs were set up to focus on improving and broadening one's general cognitive and affective skills and knowledges. Perhaps there are some indirect benefits afforded one system as a result of training in the other, but the benefits are not as directly applicable nor noticeable, as should be the case, if the two training systems had been purposely designed to interact and reinforce the training in each other. Even in the ART program, which has a policy link to the skills training system, the content has not, with some small exception, been designed to complement, reinforce, or even relate to, the content encountered in Recruit Training. This is particularly inappropriate, since the purpose of the ART training is to assist marginally skilled personnel in successfully completing RT.

The content of the ART program at all three locations is of a general educational nature, in which commercially available, and locally developed, beginning reading and public school remedial reading training materials are used. Some of the programs have interspersed Navy terms and vocabulary words in their general materials, and have provided some minimal training in RT basic subjects. However, aside from these similarities, there is considerable difference between the three programs, including terminal objectives, assessment instruments, emphasis in course content, program length, instructor philosophies, and program resources. So, while there is a formal regulation requiring the conduct of ART for specified personnel, there is only minimal regulation on the conduct/content of the training. The latter has been left to the discretion of local commands, thus permitting wide variability in the three programs.

In examining the Army and the Air Force systems in relation to content linkages, it was found that while the Air Force and Navy programs are similar, the Army's program is completely different, both in its materials and basic philosophy. The Army's AITPT program is a job-related reading program utilizing the materials which the student is expected to use both in his job skills training program and out on the job itself. The training is, however, presented in isolation of the actual job skills training as a prerequisite training program which people must complete prior to going into their job skills training.

Career Counseling System

Currently, the Navy's Career Counseling System has a two-fold purpose: (1) to maintain an adequate force of qualified active-duty personnel and (2) to provide career development information and guidance to meet the individual needs of all enlisted Navy personnel (Meshi, Holoter, Dow, & Grace, 1972, p. 1). The system is staffed with three levels of counselors: full-time career counselors at the command level and part-time counselors at the department and division levels. Through the use of personnel interviews, content area experts, and other personal interactions, career counselors try to facilitate the dissemination of information to enlisted personnel in the context of three basic career phases (Meshi et al., 1972): (1) Preassignment Contacts, (2) In-Service Counseling Actions, and (3) Post-Separtion Alternatives.

Phase 1 activities parallel the AFEES and Recruit Training activities of the Job Skills Training System. The purposes of this phase, conducted mainly by the recruiter with assistance from administrative personnel, are (1) to acquaint civilian personnel with the various opportunities available to people through a career in the Navy, (2) to assess the skills and abilities of potential recruits, and (3) to initiate the recruit's Navy career by assignment to an entry-level job skills training program.

Phase 2 is divided into three basic types of activities: Career-Related, Preseparation-Related, and Reenlistment-Related Inverviews, which parallel the various career/training activities enlisted personnel encounter after completion of Recruit Training. The Career-Related Interviews are conducted by various administrative, command, and advisory personnel to help enlisted personnel keep abreast of occupational and educational opportunities, changes in work assignment and command mission, progress in rating, requirements for advancement, and other benefits and considerations relevant to the person, his family, or the Navy. The Preseparation-Related Interviews are conducted to assist the enlisted personnel in deciding about a Navy or civilian career by discussing the opportunities and advantages available in both areas. In the event of his reenlistment, a series of congratulatory interviews are conducted and the person moves back into the Career Interview subphase of the In-Service Counseling Phase. These three subphases operate in this cyclical fashion until Phase 3 occurs.

Phase 3 is designed to assist Navy personnel who are either retiring or separating from the Navy by acquainting them with the various benefits and opportunities available to them as a civilian because of their service with the Navy.

At all times, retirees and active duty personnel are eligible for special counseling services, which are provided in four broad areas: transfer, new assignment, details concerning other Navy related assistance, and personal services. Included in the personal category are: legal assistance, religious counseling, marriage, alcohol or drug problems, minority group assistance, medical assistance, and education assistance. These special counseling sessions are conducted by area experts provided by the career counselors. For instance, personnel needing or desiring educational counseling are referred by the career counselor to the ship or station's Educational Services Officer (ESO), or the NCFA Counselor.

Formal Linkages of Counseling Program With GED and Job Skills Training

As indicated above, there is frequent interaction between Phases 1 and 2 of the counseling system and the various components of the job skills system. Many of these linkages are formal in nature; that is, they are mandated by Navy regulation or policy such as the annual personal career progress interview, formal briefings of group or individuals re new policies/programs/career opportunities, and the periodic review/update of personnel records with the individual. Other linkages are less formal in that the interaction is initiated by the enlisted person himself through a request for special counseling or some career or reenlistment information. In comparison, there is little formal linkage between the counseling and the GED systems except that which occurs when an enlisted person is referred by the career counselor to an ESO or NCFA counselor for educational assistance. Otherwise, interaction of both the career counseling and the job skills systems with the GED system seems to occur most frequently on a voluntary, self initiated, walk-in basis.

The current linkages between the job skills and counseling system appear to be facilitated by the fact that various administrative personnel perform dual roles and, thus, link the two systems. For instance, Personnelmen are an integral part of the administrative network of any Navy activity, and they are also utilized by the counseling system to conduct some of the interviewing and counseling activities. For the GED and counseling systems, the only example of a linkage based on multiple roles is the Educational Services Officer, who represents the GED system and is also utilized as a content expert by the counseling system. Because the ESO also has responsibility for obtaining, distributing, and monitoring the Rate Training Correspondence Courses, he forms a three-way link among the job skills training, GED, and counseling systems. Generally, it appears that the career development system could be used more advantageously in the operation of an integrated job skills/reading skills training system.

One obvious area of contribution is in the counseling of personnel about the need for reading training for career development, and the explanation of how to obtain such training in the Navy's education system. A second, perhaps not so obvious, area in which the counseling system could help is in providing closer linkage to psychological, legal, and what might be called "life problem solving" services for marginally literate personnel who are more likely to need such services than more highly competent personnel (Hoiberg, Hysham, & Berry, 1974).

DESIGN, DEVELOPMENT, AND IMPLEMENTATION OF AN INTEGRATED JOB SKILLS/READING SKILLS TRAINING SYSTEM

The transformation from a career development system that treats job skills and reading training as unrelated programs and that teaches completely different knowledges and skills, to one in which job skills and reading skills are developed in an integrated manner can proceed in an evolutionary manner. Early changes should build on what already exists by tightening the policy linkages among the job skills training, career counseling, and General Educational Development (GED) components of the career development system, and by developing content linkages among the job skills and GED systems. An integrated job skills and GED system should be developed through R&D that begins with development of job-related training programs to prepare trainees for reading tasks in A school, in recruit training, and on the job at duty stations.

Initial Changes to Existing System

Changes in Policy Linkages

Policy linkages can be tightened by requiring reading achievement testing at all Recruit Training Centers rather than permitting each RTC to formulate and conduct its own policy and methods for determining individual reading training needs. Mandatory testing of all recruits in mental categories III and IV might be initiated at all three RTCs using the same test. Ideally, this test would be similar to the NRTT in that it would test the respondent's ability to perform reading tasks encountered in Navy training programs. However, even a standardized test, consistently applied across the three RTCs, could assure a more uniform basis for assignment to reading training than currently exists.

Policy linkage can also be tightened for A school training and on-the-job training by the specification of mandatory levels of achievement. Again, achievement should be specified in terms of the performance on tasks using job reading materials, and calling for the types of information processing useful for performing Navy reading tasks. Although the precise specification of such tasks would require considerable research, it is possible to proceed on the basis of the best state-of-the-art information and to introduce revisions as research developments permit.

Career counseling policies can be modified to require education officers to provide information about the reading demands of Navy ratings based upon the discussion in this report and in other documents that discuss reading problems and training within the armed services in general (Sticht & Zapf, 1976; Sticht, 1975a, b) and the Navy in particular (Duffy et al., 1975). This might be facilitated by the development of a succinct pamphlet containing pertinent information that education counselors could use.

Career counseling regarding the literacy demands of Navy ratings should begin early, during the preinduction phase, with repeated discussions of the role of reading in overcoming the various barriers to career advancement discussed earlier. This type of counseling should be included in the ART as a means of helping the person of very low literacy skills to understand the need for and relevance of reading skills and other information processing capabilities that lead to a more adaptable person capable of meeting the Navy's job performance and advancement requirements.

Additionally, job supervisors can be directed to recommend persons suspected of having reading problems to contact the education counselor. Of course, unless there is a literacy training program that produces results which supervisors can detect and appreciate, this type of job skills/reading skills linkage will not be sustained. This is another reason for developing reading programs with direct job relevance.

Changes in Content Linkages

The improvement of relationships among job skills training and reading training by policy changes is a relatively simple matter. It mostly requires making decisions and then converting these decisions into regulatory directives. The development of content linkages among job skills and GED systems is more complicated. Beginning with the current system, the content linkage between Academic Remedial Training (ART) and Recruit Training (RT) can be tightened by the provision of a policy directive that all three ARTs will immediately provide at least 1 hour of practice per day in reading the Blue Jackets' Manual and the Basic Military Requirements Manual. While leaving open the exact nature of the reading training and, hence, still permitting a diversity of practices and a range of effectiveness, such a directive would at least ensure some common element of reading training focused on job skills training.

The problem of changing the content of reading training programs for duty station personnel is even more formidable because there is no existing, systematic reading training program offered for them. Instead, a reading course may be offered on an as-needed basis at a given naval base or aboard ship. Sometimes, Navy personnel attend civilian institutions such as a local community college with a PREP program. It is probably unrealistic to require these civilian programs to develop Navy job-oriented reading materials within their own budgets and time constraints, so a Navy-sponsored development effort will more than likely be necessary. In fact, a similar effort is currently underway in the Air Force (Huff, Sticht, & Joyner, 1976).

R&D Toward an Integrated System

The changes in policy and content linkages between the job skills training and GED components of the Navy's career development system require very little research and development. However, they fall far short of producing an effective, integrated job skills training and GED system. For instance, simply requiring ARTs to have students read the RT manuals for an hour a day does not provide for the systematic acquisition of a uniform set of skills and knowledges. This requires a carefully developed program of job-related reading tasks with formative and summative evaluation instruments for prescribing instruction and for quality control.

The required approach is to develop an integrated job skills training and GED system through R&D that begins with the development of a job-related reading program to prepare trainees for reading tasks found in A school. This fixed duration program is to be offered in a conventional classroom just prior to A school. It is aimed at providing reading training in one of the three career cluster areas--service/maintenance, technical/maintenance, and data--because there are too many different ratings to attempt to build a separate reading program for each one.

Following the development of job-oriented reading programs for the three career clusters of A school preparatory training (ASPT), similar procedures could be followed to develop job-related reading programs to prepare people for RT (using the current Academic Remedial Training program) and to provide job-oriented reading training for duty station personnel. (Because of the similarity of the RT and ASPT programs, the development of an RT job reading program will not be discussed.)

Following the development of the three job reading programs, a second phase of R&D activities can be undertaken to integrate the ASPT program into the regular A school program with the goal of reducing, as much as possible, the front-loaded, fixed-duration job reading program. This will require system engineering of A schools to reduce "nice-to-know" information and retain only training that is needed for entry into job duty. Additionally, the A school training should permit self-pacing of instruction to reduce the training hours spent by personnel to complete the course. Because systems engineering of a training program requires a lot of time, money, and manpower, it is expected that this revision would occur as part of the Navy's regular updating of training programs. This would constitute a long-term, gradual modification of the Navy's training system.

During the design of the self-paced A school training, the front-loaded job reading program should be modified so that reading training is available during the regular job skills training day and is closely articulated, in sequence and scope, to the job skills training.

Following this second phase of activities, which should probably be extended only to A schools at which reading is a major problem, a similar integration can be accomplished for RT. For duty station training, a major effort would be to integrate the job reading skills training into Rate Training Correspondence Courses that have been thoroughly system engineered to train only those aspects of Navy job skills and knowledges that are not better learned through OJT.

Thus, the major steps envisioned for an R&D program to develop an integrated job skills and reading skills training system included the following:

1. Develop a front-loaded, fixed-duration A school preparatory training (ASPT) program for each of the three career cluster areas.

2. Develop a job-related academic remedial training (JART) program of a front-loaded, fixed-duration nature for recruit training.

3. Develop a job-related reading program for duty station personnel, consisting of reading training materials in the three career cluster areas.

4. Systems engineer selected A schools and integrate the ASPT into the regular training day.

5. Systems engineer RT and integrate the JART into the regular training day.

6. Systems engineer the rate training correspondence courses and incorporate job reading training into them.

Example of an A School Preparatory Training (ASPT) Program

The first product required in the R&D program is a fixed-duration, front-loaded, job-related reading program to prepare personnel for the reading tasks to be encountered in A school. The Army's Advanced Individual Training Preparatory Training (a job-related reading program) is the model for the discussion in this section (Sticht, 1975a).

The ASPT student population is assumed to be reading below the 7.0 grade level as measured by a standardized reading test or by a Navy job reading test scaled to produce grade level scores. This level is based on Figure 3, which showed that 70 percent of the NRTT items were answered correctly by more than 50 percent of the people reading at the 7th grade level. Also, research on reading demands suggests that grade 7.0 is a reasonable minimum target objective for reading training (Sticht, 1975a). It is further assumed that the lower reading level for students in ASPT will be around the grade 4.0 level. Presumably, people below this level will have been brought to the 4.0 level in the Academic Remedial Training given during RT.

The duration of the front-loaded ASPT program is assumed to be 6 weeks. Occasionally, the assignment of a more skilled reader to the program will require that he be moved to A school. Other problems involved in early graduation include waiting for orders, waiting for an A school opening, and maintaining the morale of those who have graduated and those who must continue their training.

Instructional Curriculum

The instructional curriculum of the ASPT consists of three strands: Reading-to-do, Reading-to-learn, and Decoding.

Strand I—Reading-to-do. This strand is illustrated in Figure 6. Essentially, it employs an instructional curriculum format with learning modules based on the types of information sought (fact-finding and following directions) and the types of information sources or displays (text, figures, etc.). Each module is accompanied by a pre- and post-proficiency test (PT), which determine eligibility for the module training and mastery of the module. Data obtained with these PTs provide formative data for module development and criterion referenced achievement data for students. The pre- and post-summative reading test shown in Figure 6 would be a Navy Reading Task Test scaled for reading grade level or normed in percentiles (if reading grade level scores are not desired). The former permit the use of the norms established for the standardized test used in scaling the NRTT and they articulate the Navy results with other programs that use reading grade levels.

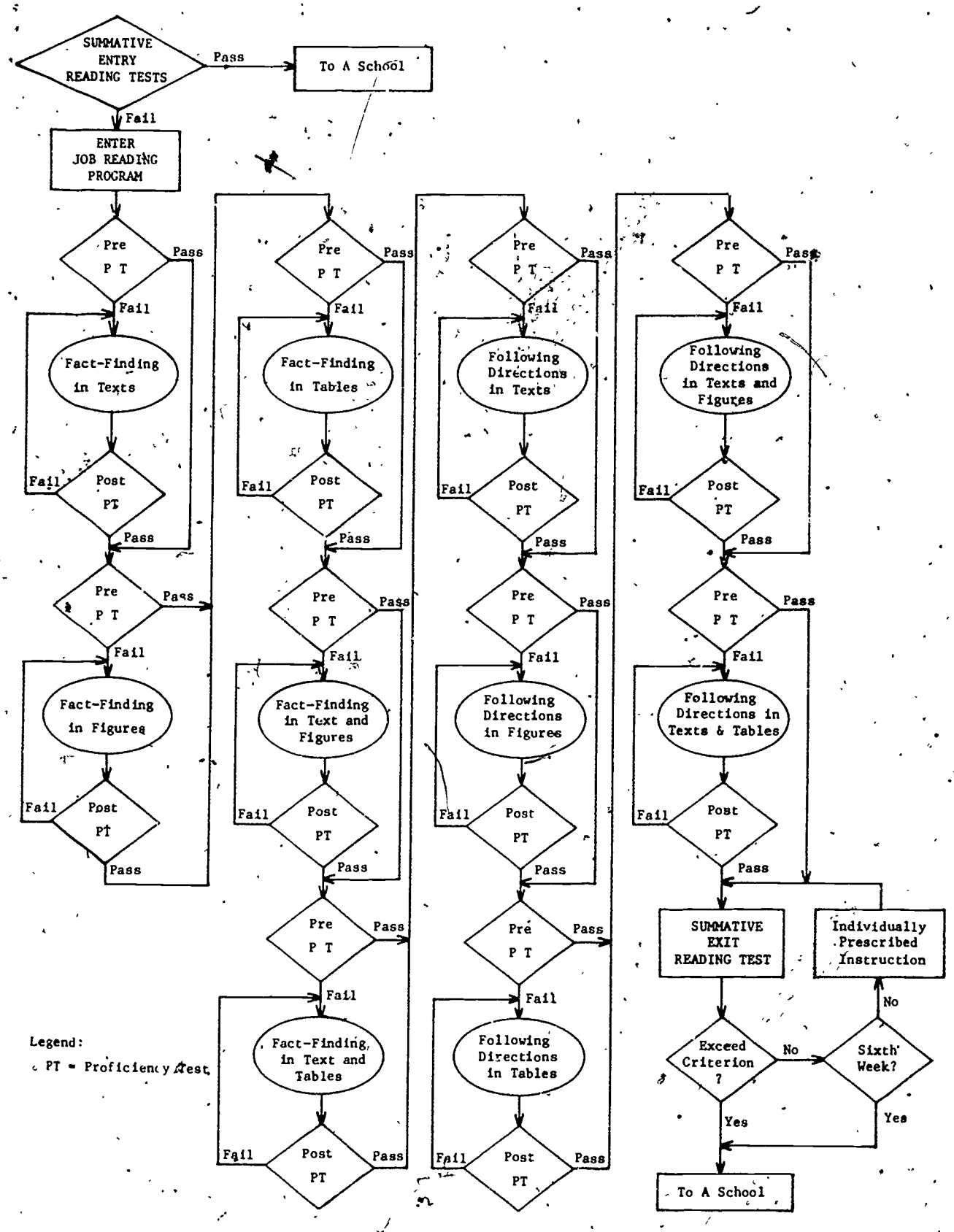

Figure 6. Strand I of A School Preparatory Training (ASPT).

The module materials should reflect the fact that Strand I is primarily intended to provide extensive drill and practice in performing Navy reading tasks. Thus, each module would consist of source materials and numerous worksheets that require that the person perform the tasks indicated by the module name. The worksheets should be designed to emphasize three dimensions: structure, content, and difficulty.

A structural worksheet should cause the person to notice how an information source or display is put together (e.g., a table may have rows, columns, headings, etc.). Specific questions should be developed to require the processing of information about structural features.

A content worksheet should cause the person to attend to the content of an information display (e.g., a fact-finding worksheet might ask for a person to locate a specific fact in a given display).

A difficulty dimension should be incorporated into both structural and content worksheets. Essentially, the idea is to start with easy questions and gradually make them more difficult in terms of the amount of information to be presented in the amount of paraphrasing (which places a stress on the students' vocabulary), or other techniques as appropriate.

The kit of more than 300 job reading tasks developed during this effort (see Footnote 1, page 12) provides a resource for the initial development of Strand I materials. This kit includes the actual materials Navy personnel reported reading on the jobs in Class A schools, and can serve as the information sources for the instructional modules. Each reading task statement in the kit includes statements on an information need the person had when the materials were read, which illustrate the types of questions that can be included in the module worksheets.

Strand II--Reading-to-learn. This strand contrasts with the Strand I activities in that it is oriented toward processing information for future use, and hence emphasizes the development of skill in manipulating written information to increase its storage in and retrieval from memory. To process information for learning, a person must have the knowledge base that can be brought to bear in comprehending the material to be learned, and he must be knowledgable of and be able to skillfully perform the following intentional learning strategies identified by Sticht et al. (1977): reread/rehearse, problem solve/question, relate/associate, and focus attention.

To promote the acquisition of a relevant knowledge base that will help learn better from their A school written materials, much of which will be written at readability levels of 11th to 12th grade (Duffy, 1976), Strand II includes materials that are written at a lower difficulty level and that incorporate the basic concepts within a career cluster.

To identify the basic topics to be discussed in Strand II, candidate lists from A school curriculum guides can be developed and content experts at the A schools and on the job can be consulted.

The content materials can be 300 to 1000 words in length with a high density of concepts. The redundancy and elaboration usually needed to explicate concepts in written materials are not needed in Strand II because the student will perform repeated readings and conduct various elaborations in storing and retrieving information.

Figure 7 presents a fictitious set of content topics that might be developed for the Data Group career cluster. (The content areas are actually taken from the content area matrices developed by Huff et al. (1976) for the Air Force's job-oriented reading program for duty station personnel.) The figure also shows the information processing activities as column headings. Cell entries suggest different types of specific activities that might be required for each content area and information processing activity reading-to-learn task.

Strand II activities would be taught in the classroom, with students working in teams or small groups, and with teacher demonstration and feedback. This approach permits students to take a break from the solo drill and practice of Strand I and to engage in social activity. This is necessary under a front-loaded, full-day-of-study type of program to prevent boredom and fatigue.

Because Strand II materials are teacher-guided, a thorough teacher's manual must be developed. Such a manual should include the rationale for the ASPT program and a summary of the general research in information processing which the Strand II activities reflect. Much of this research is summarized in Dansereau, Long, and McDonald (1975); Frase (1975); and Sticht (1975a). Hayes (1976) also suggests topics to be discussed in this regard.

Evaluation of Strand II activities is less systematic in the formative area than Strand I. In Strand II, student classroom products are evaluated by the teacher and by other students in group discussion. In addition to providing the teacher with opportunities for evaluation, these discussions also present the information in the written passages in a spoken form and can be used for defining unfamiliar words and elaborating on unfamiliar concepts. These discussions should also be used to introduce new content areas. The oracy to literary sequence is discussed elsewhere (cf, Sticht, Beck, Hauke, Kleiman, & James, 1974).

Informal evaluations can be supplemented by pre- and post-summative tests developed for each of the four categories of information processing. Sticht (1976) presents examples of two tests of relate/associate activities: skill in making classification tables and flow charts using content area passages. Additional tests can be developed for the remaining information processing activities.

Additionally, pre- and post-test summative measures of the acquisition of knowledge included in the content area passages should be constructed to measure the student's development of a knowledge base for learning by reading in A schools.

Strand III--Decoding. This component of the ASPT program is meant to provide students with knowledge useful for transforming printed words into spoken words and sentences into semantic representations. Additionally, the decoding strand provides practice to develop skill in efficiently transforming connected prose into meaning.

CONTENT AREAS	REREAD/ REHEARSE	PROBLEM SOLVE/ QUESTION	RELATE/ ASSOCIATE	FOCUS ATTENTION
Career Field Progression (Skills upgrading process, skill levels, career field general structure)	Efficiency of Reading	Answering questions about who, what, where, when, why.	Classification matrix construction.	Underlining
Communications Security (Security classifications, methods of transmission, accountability of classified information)	Preview/ Review Techniques	Writing questions.	Drawing illustrations.	Outlining
Supply Requisitions (Supplies and equipment custodial accounts, submission procedures, controlling documents & forms)	Skimming	Solving vocabulary test problems.	Constructing flow charts.	Summarizing
Publications Management (System, updating procedures, files)	Scanning	Test taking practice.	Paraphrasing.	Notetaking

Figure 7. Illustration of a partial matrix for Strand II: Reading-to-learn content passages and information processing activities to be performed on the content passages for the Navy's Data Group career cluster.

The knowledge useful for transforming printed words into spoken words is that generally known as phonics or sight-sound correspondences. While people who develop reading skills in a "normal" manner over the school years may not be conscious of these correspondences and may not require explicit instructions in such knowledge, poorer readers may find this information of great value. Although the number of sight-sound correspondence rules is so great that teaching all of them is out of the question, explicit instruction in a few general rules can be of heuristic value to the poorer reader.

At a more complex level of analysis, knowledge for decoding sentences can also be a useful tool for poorer readers. The Army's functional literacy program contains a simplified approach to the decoding of sentences that divides all sentences into two basic parts: (1) the main idea, and (2) more about the main idea (Sticht, 1975a). In turn, the main idea is broken into subject and action while the "more about" component is discussed in terms of who, what, when, where, etc. Th s type of knowledge may be of most value where complex texts must be analyzed.

The third part of the decoding strand simply provides practice in reading to develop the same capacity for storing information presented in the printed form that one has for processing spoken language. For this purpose, textual materials should be used that present narratives such as Navy history or the content passages of Strand II.

Recently, an experimental test for assessing discrepancies in oral and written language capacities was developed for the Air Force (Sticht & Beck, 1976). This test might be examined for ideas about assessing the development of automaticity in reading which, in the case of the Air Force test, is considered to be achieved when one uses printed language as accurately and efficiently as one uses the spoken language.

Implementation

The developmental effort should involve an experimental school where tryout of techniques, materials, and procedures, both for teaching students and training instructors, can take place. The current ART may serve as an initial tryout school but, as soon as a rough-but-ready curriculum can be developed, an operational, experimental ASPT should be established. To gain credibility for subsequent dissemination and implementation, it is essential that the development and implementation team have extensive experience in operating an operational school, and in dealing with the various administrative and instructional "crises" that "operational" people experience. This experience makes possible the development of greater rapport for the dissemination of the ASPT program.

An Integrated Job Skills/Reading Skills Training Program

The development of the front-loaded ASPT program permits a total concentration on the development of an effective job-oriented reading training program. However, once considerable experience with such a program has been achieved, the next step is to develop an integrated job skills and reading skills program in which the training day contains both types of training. As

mentioned earlier, the change from the front-loaded to integrated reading training is evolutionary, occurring as part of the regular upgrade of the job skills training programs.

To accomplish the integration of job skills and reading skills training, the training program development guidelines must require that new programs or program revisions eliminate "nice-to-know" information to reduce total training time. Thus, extra time spent in reading training would produce little or no increase in the total man-days spent in the resident training program. The object is to overcome the costs of a front-loaded program, which adds on to the time spent in the resident training pipeline while reducing the learning requirement of the job skills training by focusing only on job-relevant, "need-to-know" information.

There is a precedent for the teaching of reading skills in the course of the training day: The Department of the Army's Marginal Man and Military Service (1965) describes research projects by the Army and Air Force to teach academic skills during basic military training. However, the reading was not job-related, nor was the basic military training program developed to be self-paced and performance oriented. Rather, the traditional classroom/lecture, lock-step procedures were in effect.

Only one case has been found in which the job skills training was first transformed from the traditional classroom to a self-paced, performance (rather than paper-and-pencil test) oriented program, and then job-oriented reading training was introduced. Hungerland and Taylor (1975) describe the effects of introducing self-paced instruction into the Army's Supplyman course. They found that, in the lock-step course, students were held in the program for 35 training days while the average time in the self-paced course was 25 days, with a range from 13 to 44 days. Only 7 percent of the self-paced trainees required additional time to complete course requirements. All graduates of the self-paced course met the same end-of-course test criterion used in the regular, lock-step course.

To incorporate reading training into the Supplyman course, the Clerical career cluster was modified from the AITPT program to focus exclusively on the Supplyman's materials. Reading training was provided for 2 hours per day for students entering the Supplyman course and who read below the 8th grade level as determined by the standardized reading tests and the special job-related reading tests used for summative evaluation of the AITPT program.

Integration of job reading training with the self-paced, modular job skills training system was accomplished by directing students from their self-paced study in a Supplyman's module to the daily block of 2 hours of job reading instruction. They then returned to their job skills training--all within the normal training day.

In addition to focusing the job reading specifically on the Supplyman's materials, the AITPT Clerical program was modified by strictly pacing the student's reading training to his progress in the Supply course.

This was done to accelerate student progress through all the job reading modules, regardless of mastery, within whatever time it took the student to complete the job skills training section of the Advanced Individual Training course.

Results showed that performance on the job reading task test (JRTT) increased from an average reading grade level of 5.5 before training to 7.2 after training, and the percentage of students meeting the minimal job reading requirement of 7th grade level on the JRTT increased from 16 percent before training to 53 percent at the end of the integrated training program. Additional details are given in Sticht (1975a).

This study suggests that it is feasible to introduce job training and job reading training within the same training day without adding to the overall training time of traditional classroom, lock-step rating training programs. Although such training is not likely to be sufficient for the poorest readers who enter the Navy, the inclusion of reading training during recruit training before the student gets to ASPT, and the provision of reading training at the duty station following ASPT, makes possible the long period of training needed by the poorest readers to utilize the printed language more adaptively for learning and task performance.

Job-Related Reading Training for Duty Station Personnel

The major difference between school and duty station personnel is that the former are in a residence training program with a daily set of activities involving learning and extensive processing of information, which involves considerable reading, while duty station personnel are in an operational mode with on-the-job training conducted in a casual manner. The pace of learning activities is much slower in OJT, where only 25 percent of the reading tasks obtained from job performers are reading-to-learn tasks. Another consideration is that duty station personnel include a wide mix of ratings, with perhaps only a few in each rating at a given duty location. Thus, few or no personnel may be available at a given time to participate in a job-oriented reading program.

The manner in which current reading instruction is delivered for duty station personnel reflects the fact that students of a wide background may appear on a sporadic basis for reading instruction. Thus, advantage is taken of civilian programs, such as community college learning centers, and of general reading classes conducted by the base education office.

To take advantage of this type of system while still providing job-oriented reading, the Navy must develop materials that are largely self-instructional or that can be administered by a teacher with a minimum of instruction. Such materials could be distributed to local reading programs or be used in a base learning center or education office as needed. An example of a job-oriented reading program being developed for duty station personnel in the Air Force is described by Huff et al. (1976); the use of a learning center on a drop-in basis for job-related reading training in the Army is discussed by Sticht (1975a).

Another alternative for duty station personnel is the development of rate training correspondence courses that (1) reflect the actual demands for knowledge on the job and (2) use exercises calling for the types of information processing activities taught in the job-oriented reading programs for recruit training, A school, and duty station personnel.

Finally, as suggested earlier, the counseling system must be modified (1) to bring to the attention of personnel the need for and availability of training in job reading skills, and (2) to assist personnel with emotional or other personal problems that interfere with career development.

DISCUSSION AND CONCLUSIONS

Navy Reading Task Inventory/Test (NRTI/T)

Although the NRTI was tested on only four personnel, the results have provided insights for future research in this area. During the development and testing of the NRTI, there was some concern as to whether or not personnel would be able to disregard the material content of the generic display when determining if they perform job reading tasks using similar displays. Analysis of the responses indicated that, indeed, people did not completely ignore the display's content. Either additional research and refinement is necessary to assist personnel in better understanding the task involved in the NRTI, or the approach has to be modified to remove the content distraction.

There was also a question of whether or not the three examples of the generic displays in the NRTI represent, in actuality, different levels of complexity, or whether the personnel were responding to the three examples with any awareness that the displays were supposed to be of different complexity. The pilot test results provided no evidence to indicate that the display complexity was a factor in the selection process. Furthermore, it is also uncertain that this dimension of complexity was tapped in the construction of the NRTT, so as to contribute to the difficulty level of the NRTT items. It may be that the difficulty of the NRTT is a function of the questions alone, or a combination of the complexity of the display and the statement of the questions.

Analysis of the NRTT data also indicated that some of the items, particularly the Following Directions questions, were ambiguously stated so as to permit a wide range of correct responses. This problem can be rectified by carefully designed multiple-choice questions.

Another concern dealing with the statement of the Following Directions items is how close an approximation these questions are to the real-world situation. This artificial creation of the reading task may be imposing unrepresentative information processing demands that are not involved in the real-life execution of this type of reading task. Additional conceptualizing of the information processing differences between the Fact-Finding and Following Directions tasks is necessary, along with more study on how to formulate the NRTT questions so as to reflect the various aspects of these two skills.

Probably the most difficult question to answer is that of the validity of the NRTI/T as a measure of the reading demands of Navy ratings. Job reading demands do not exist in and of themselves; they are created. The only way to determine the validity of an instrument's ability to measure an artificially created requirement is to have a model or theory against which to compare the results. In part of this research, a model was developed for the collection of samples of job reading tasks. Following the guidance provided by the model, the Job Reading Task Interview was constructed and permitted the collection of a large number of job reading tasks. However, the

model was not appropriate to, nor useful for, developing the Navy's Job Reading Task Tests. What was needed was a "reading test model" that would include theoretical constructs for better identification and understanding of the information processing demands required in performing reading tasks so that these demands might be reflected in the construction of the NRTT itself. By using such a model, it is expected that the reading task tests would better simulate the information processing done in actual performance of reading tasks in a job situation. Also, without this model, it is difficult to know if people are making a distinction between the generic display and its content, or if, in fact, there are any differences in the manner in which these displays are used with the two generic skills of Fact-Finding or Following Directions. As mentioned above, the problem of formulating these questions needs more conceptual development and exploration so as to determine if there are major conceptual differences in the information processing between these two skills, and, if so, if test items can be written to evaluate this difference. Given these methodological considerations, it is not clear that the current NRTI/T actually represents our own conceptual distinctions, or even if these are useful ways of thinking about job reading tasks.

What has been accomplished is the initial exploration of the feasibility of determining job reading requirements using a methodology which both identifies the types of reading tasks performed in the job and the level of general reading skill required to perform that set of reading tasks. As a result of this exploratory research, three Navy Reading Task Tests were developed and scaled, a job incumbent's and supervisor's version of the Navy Reading Task Inventory were developed and pilot tested, and a procedure for combining the data from the NRTI and the NRTT into a single statement of the reading requirement for a specific rating was developed. In addition, the methodological and procedural problems encountered in the research and development of the NRTI/T were discussed and recommendations for further modification and refinement of the NRTI/T have been made. Given these experiences, test results, and test construction limitations, it is the opinion of the authors that the NRTI/T approach can, with additional refinement, be used effectively to assess the reading demands of Navy ratings, as well as to provide information so that job-related reading curricula and objectives can be more meaningfully conceived.

Job Skills Training and GED Systems

Analysis of the interview data and inspection of the Career Development System both indicated that reading could act as a barrier to advancement for a substantial number of enlisted personnel, and that the Navy does not have any systematic approach to literacy training. However, the effect of this barrier is unknown and needs to be assessed through future research. Also, considerable interaction was found between the job skills training and career counseling components, but again, there appeared to be little or no interaction between the career counseling and GED components of the Career Development System. Thus, it appears that even though the Navy's Career Development System is composed of three major subcomponents, there are only weak or limited formal and informal linkages between and across them. In fact, the GED subsystem seems to operate almost as a separate nonrelated entity. However, it does seem quite possible to utilize this current system in the development of the integrated job skills/reading skills training system with only minor modifications.

Integrated Job Skills/Reading Skills Training Program

The long range changes for developing an integrated Job Skills/Reading Skills Career Development System require a sustained program of R&D. The general approach is composed of two basic stages.

Stage 1 requires the development of individual job-related reading programs for Class A School Training, Recruit Training, and permanent duty station personnel. In this stage, the A School and Recruit Training job-oriented reading programs would be developed as front-loaded (given prior to the job skills training), fixed duration (6 weeks long) programs designed to prepare personnel to perform the reading tasks to be encountered in their skills training program. The suggested developmental sequence involves the initial development of an A School Preparatory Training (ASPT) program for selected ratings, followed by revision of Recruit Training's current Academic Remedial Training program. The duty station personnel program would be the last program developed. Since it is not a resident course and the program must be designed to accommodate students of a wide background appearing on a sporadic basis for training, this calls for the design of a job-related reading program of a largely self-instructional nature, which could be administered by a regular classroom teacher with a minimum of instruction. This Navy developed program could then be utilized in the current remedial reading training program provided under the PREP program or as part of the training provided in a learning center environment.

Throughout this phase of the R&D activities, it is necessary that an experimental reading school, under the control of the R&D staff, be available to provide development and implementation staff members operational experience in operating a reading school, as well as to permit the tryout of techniques, materials, and procedures, both for teaching students and training instructors. By following this developmental sequence, it permits the complete development of effective job-oriented reading programs prior to initiation of Stage 2 activities.

The Stage 2 R&D activities are concerned with integration of the fully developed A School Preparatory Training and Academic Remedial Training job-oriented reading programs with their appropriate job skills training programs. This can basically be accomplished in a two-fold effort. First, system engineer the training program to reduce "nice-to-know" information and to permit self-pacing of instruction. This would be followed by modification of the above job reading programs to fit into the engineered job skills program through careful articulation of the sequence and scope of the various skill training activities.

The development of this type of integrated, self-paced training both eliminates the costly front-loaded, fixed duration programs, and permits the faster matriculation of brighter students, thus effecting not only savings in training costs, but also in training time. In addition, job-related training enables personnel to become better performers of job reading tasks.

The overall goal of the integrated Job Skills/Reading Skills Training System is to provide a sustained period of training, available to all levels of enlisted personnel, which both adapts the training to their individual learning needs and trains them to become more adaptive learners.

Cost Effectiveness of Job-Related Vs. General Reading Training

Few empirical data exist for evaluating the cost-effectiveness of job-related versus general reading training. In developing the Army's program, a comparison was made of improvement in job reading task test scores for graduates of the job-related reading program with those of graduates from the Army and Air Force general remedial reading training programs (Sticht, 1975a). Results indicated that the job-related reading program produced three times as much improvement in job reading task performance as the general reading program did. This was accomplished in less time than the Air Force program and at no more time than the Army's general reading program. Because Army manuals and materials were used extensively, material costs were kept at or below those of the Army's general reading program.

Thus, the scant data available suggest that the job-related reading program is a more cost-effective program for producing improvement in the performance of job reading tasks. Aside from this, the logic of reducing training time and making reading training more job relevant by the development of an integrated job skills and reading skills training system must carry the argument for a more cost-effective approach to reading training.

RECOMMENDATIONS

A major purpose of the entire enterprise of developing an integrated job skills/reading skills career development system is to improve the job proficiency of personnel while reducing the costs of training. To do this, it is recommended that:

1. The training programs be systems engineered and self-paced to reduce training time.

2. Training time be reduced for reading programs such as Academic Remedial Training, which add several weeks of resident training to personnel training time, by converting general reading training into job-oriented reading training, and then integrating the job skills and reading skills training.

3. The effectiveness of reading training for improvement of job performance be increased by converting general educational development programs, such as ART and education office offerings, into job-related reading which, while emphasizing the development of the same kinds of information processing skills developed (usually inefficiently) in GED programs, also teach a job content knowledge base for performing job-related reading tasks.

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APPENDIX A

NAVY READING TASK TESTS ITEMS AND ANSWER KEYS (FORMS E, M, AND D)

Experimental Navy Reading Task Test (NRTT)

1. Instructions to students.

2. The NRTT: Forms E; M; D.

NAVY READING TASK TEST

(Instructions to Students)

You are here today to find out how well you can do some typical Navy job reading tasks. You will use your Bluejackets' Manual to answer the kinds of questions that have to be answered when performing various Navy jobs.

Is there anyone who does not have a copy of the Bluejackets' Manual with him at this time?

On the half-sheet of paper that is attached to your test

1. PRINT your last name, first name, and middle initial.

2. On the second line, write your social security number.

3. On the third line: If you have ever been in the Navy before, write "YES" and the number of years you were in the Navy. If you have not been in the Navy before, write "NO" on the third line.

4. Circle the number which indicates the highest year of education that you have completed.

Three forms of this test have been distributed, each with a different, but similar set of questions. Each test has 16 questions in it. You will earn one point for each question that you answer correctly. There is no penalty for a wrong answer, so try to answer all the questions. Don't get hung up on a question that is hard for you--skip it, go on to the next question, and come back to the hard question when you have finished the others.

Please look at your test.

All answers for these questions can be found in the Bluejackets' Manual. Notice that the answers for questions 1, 2, and 3 are found by using ONLY the Table of Contents, and the answers for questions 4, 5, and 6 are found by using ONLY the Index of the Bluejackets' Manual. For questions 7 through 16, you are given the page number or numbers on which the answer can be found and the type of material in which the answer is found. Notice that you will be using five different types of material to answer these questions--text, which is just straight printing; figures; tables; text and figures combined; and text and tables combined.

Write your answers in the spaces provided on the test sheet. When answering a question, be sure to give a complete answer to each question. Some of the questions will require answers longer than just a few words. Be sure to read each question carefully, so you know exactly what the question is asking.

We will now go through several practice questions of the type you will find on the test.

PRACTICE QUESTIONS

OK, does everyone understand how to take this test? Are there any questions? If you have a question during the test, raise your hand and someone will come by to help you.

You will have 45 minutes to complete the test. If you finish the test early, review your answers and then sit quietly until the end of the test session. Are you ready? Begin.

PRACTICE QUESTIONS ******* PRACTICE QUESTIONS ******* PRACTICE QUESTIONS

ANSWER KEY

Example 1

Using only the Table of Contents, answer the following questions.

a. What is the title of the chapter where you could find information about different types of ships?

SHIP TYPES

b. What is the page number where you would look to find information about different types of ships?

202

Example 2

Using only the Index, give the page number(s) where you could find the following item.

Lower Deck Patrol 169

Example 3

Type of Material	Page	
Text	457	Why is the metal nozzle at the end of a fuel hose grounded?

TO PREVENT SPARKS FROM STATIC ELECTRICITY.

Example 4

Text & Figure	487	Situation: You are lifting an injured patient by using the "Fireman's Lift." You have lifted the patient up to his knees. What else must you do before you can begin to raise him to a standing position?

SLIDE YOUR HANDS DOWN LOWER AND CLASP THEM AROUND HIS BACK.

ANSWER KEY

NRTT FORM E

April 1976

Using only the Table of Contents, answer the following three questions.

1. What is the title of the chapter where you could find first aid instructions for treating a burn? FIRST AID

2. What is the chapter number in which you could find information about firefighting? 15

3. What is the page number where you would look to find information about the history of the Navy? 597

Using only the Index, give the page number(s) where you could find the following items.

4. VRB 567

5. Rigging wire rope (a) 347-355, 447 (b) 347,348,349,350,351,352,447
(c) 347-447 (d) 347

6. Precautions when handling ammunition (a) 244, 435-436 (b) 244
(c) 435 (d) 436

Location of Material To Be Used In Bluejackets' Manual

	Type of Material	Page	
7.	Text	173	In assigning enlisted details, who serve as assistants to the ship's master-at-arms? (a) DIVISION POLICE PETTY OFFICER (b) DPPO
8.	Fig 15-7	295	How many 100-ft hose sections are included in a standard shipboard fire plug installation? (a) 2 (6) 200 feet
9.	ble	245	What is the weight of the M16 rifle? 7-1/2 lbs
10.	Text & Fig	381-383	When using a spray painting gun, how far from surface should the gun be held? 6" - 10"
11.	Text & Table	206	What does the general ship classification for a seaplane tender mean? AUXILIARY

	Material	Page	
12.	Text	476	Situation: You are treating an unconscious person for heatstroke. You have moved the person to a cool place and removed his clothing. What else should you do before you spray his body with cold water?

PLACE ON BACK WITH HEAD AND SHOULDERS RAISED.

13.	Fig 15-8	296	Situation: You are fighting a fire using an all-purpose hose nozzle in the high velocity fog position. You have just received orders to use low velocity fog on the fire. After you have turned off the water by moving the lever to the "SHUT" position, What two things must be done to get low velocity fog?

ATTACH 4-FOOT APPLICATOR (FOG HEAD) AND MOVE HANDLE TO FOG POSITION.

14.	Table	72	Situation: You have been given instructions to check all clothes to make sure they are marked in the right way. When checking, you find out that your raincoat has not been marked. Where should your raincoat be marked?

INSIDE ON LINING, THREE INCHES BELOW COLLAR SEAM.

15.	Text & Figures	381-383	Situation: You were asked to paint a small building using a spray-painting gun. You have painted the entire building except for the corners. How should the corners be painted?

(a) SPRAY DIRECTLY INTO CORNER, NOT PAST IT.
(b) SPRAY UP TO WITHIN 2 INCHES OF CORNER, TURN GUN SIDEWAYS & SPRAY DOWNWARD, SPRAYING BOTH SIDES AT ONCE.
(c) CENTER THE GUN DIRECTLY INTO THE CORNER.

(An answer with any or all of this information shall be scored correct.)

16.	Text & Table	206-207	Situation: You are on watch and have been told to report all ships that you see. When reporting, you have been told to first give the ship's general classification and then the designation. You have sighted a light cargo ship. What do you report?

(a) LIGHT CARGO SHIP AKL (b) AUXILIARY - AKL (c) AKL

ANSWER KEY

NRTT FORM M
April 1976

Using only the Table of Contents, answer the following three questions.

1. What is the title of the chapter where you could find first aid instructions for treating a burn?

FIRST AID

2. What is the chapter number in which you could find information about firefighting?

15

3. What is the page number where you would look to find information about the history of the Navy?

597

Using only the Index, give the page number(s) where you could find the following items.

4. VRB — 567

5. Rigging wire rope — (a) 347-355, 447 (b) 347,348,349,350,351,352,447 (c) 347-447 (d) 347

6. Precautions when handling ammunition — (a) 244, 435-436 (b) 244 (c) 435 (d) 436

Location of Material To Be Used In Bluejackets' Manual

	Type of Material	Page	
7.	Text	365	In target detection, what does IFF mean?

IDENTIFICATION, FRIEND OR FOE

8.	Fig 20-2	409	How many white navigational lights are required for a 200-ft power vessel underway under international rules?

3

9.	Table	412	What does three short blasts of a whistle mean in international waters?

MY ENGINES ARE GOING ASTERN.

10.	Text & Figure	246-247	When stripping a .45 caliber pistol, what must be removed from the muzzle end of the barrel?

(a) BARREL BUSHING. (b) RECOIL SPRING PLUG (c) BARREL BUSHING & RECOIL SPRING PLUG.

11.	Text & Table	341	How many fathoms of chain are in a 4 shot anchor chain?

60

	Type of Material	Page	
12.	Text	451	Situation: You have been asked to go aloft to work on the masts and stacks. You have read your work assignment and are about ready to go aloft. What else must you do before you go aloft?

OBTAIN PERMISSION FROM OOD.

13.	Fig 16-25	355	Situation: You are on a delivery ship rigging an all-wire span for fueling at sea. You have attached the trolleys and the free trolly to the wire span. What else must you attach to the wire span?

PELICAN HOOK, HOSE CLAMPS, RETRIEVING WIRE, OUTBOARD SADDLE, FUEL HOSE.
(An answer with any or all of this information is scored correct, unless additional information is included, in which case the answer is scored incorrect.)

14.	Table	329	Situation: You are in charge of loading personnel on LCVPs. The four crew members are already in the boat. If you load the boat to capacity with combat-equipped troops, What will be the total number of personnel you can put in the boat?

(a) 36 (b) 40 (36 + 4) (c) 40

15.	Text & Fig 16-4	315-316	Situation: You are putting a permanent whip on a line. You have finished binding and are working on the last cross-seize. How do you finish whipping the line?

(An answer with any or all of the information given below shall be scored correct.)

(a) SHOVE NEEDLE THROUGH MIDDLE OF STRAND AND CUT TWINE.
(b) SHOVE NEEDLE THROUGH MIDDLE & CUT.
(c) THE LAST ONE GOES THROUGH THE MIDDLE.
(d) PULL GOOD AND TIGHT.

16.	Text & Table	225-226	Situation: You are responsible for classifying merchant ships. What classification would you give a ship with the following characteristics: A 475-ft passenger ship that carries 300 passengers powered by turbo electric drive and has 2 propellers?

PI-SE2

ANSWER KEY

NRTT FORM D
April 1976

Using only the Table of Contents, answer the following three questions.

1. What is the title of the chapter where you could find first aid instructions for treating a burn?

FIRST AID

2. What is the chapter number in which you could find information about firefighting?

15

3. What is the page number where you would look to find information about the history of the Navy?

597

Using only the Index, give the page number(s) where you could find the following items.

4. VRB

567

5. Rigging wire rope (a) 347-355, 447 (b) 347,348,349,350,351,352,447
(c) 347-447 (d) 347

6. Precautions when handling ammunition (a) 244, 435-436 (b) 244
(c) 435 (d) 436.

Location of Material To Be Used In Bluejackets' Manual

	Type of Material	Page	
7.	Text	390	When calculating GMT, how many hours would you add to the standard time if you were in zone +3?

3 HOURS

8. Fig 16-18 348 In addition to the boom heel swivel fitting, what else is attached to the kingpost?

(a) SWIVEL FITTING FOR TOPPING LIFT.
(b) SWIVEL FITTING FOR TOPPING LIFT & BOOM STEP BRACKET

9. Table 416 What is the meaning of this symbol, *****, when used in a fog signal table?

RINGING A BELL FOR FIVE SECONDS.

10. Text & Figure 413-414 When two vessels meet end on, how do they pass?

PORT TO PORT

11. Text & Table 135 In a single 24 hour period, how many times are 8 bells struck?

6

	Material	Page	
12.	Text (An answer with any or all of the information given below shall be scored correct.)	317	Situation: You are making a long splice. You have completed the first operation and have pairs of strands at three positions. After each of these strands are halved, What is done with the four halves before the loose ends are trimmed?

(a) TWO ARE TIED AND THE REST ARE TUCKED OVER AND UNDER THE STRANDS.
(b) TWO ARE TIED TOGETHER WITH OVERHAND KNOT, TWO ARE TUCKED OVER AND UNDER ONE OF THE FULL REMAINING STRANDS.
(c) ALL STRANDS ARE TUCKED.

13.	Figure	348	Situation: You are rigging a single swing boom. You have completed all the rigging except to rig the topping lift leadline. Which three blocks must this line go through before it reaches the gypsy head of the winch?

SNATCH BLOCK, DOUBLE TOPPING LIFT BLOCK AT KINGPOST, DOUBLE TOPPING LIFT BLOCK AT BOOMHEAD.

14.	Table	416	Situation: You are in charge of sounding fog signals. Your ship is towing another power vessel when you encounter heavy fog. What signal will you sound and how often will you sound it?

(a) —— o o ONE MINUTE APART. (b) A LONG BLAST, 2 SHORT BLASTS, 1 MINUTE APART. (c) A 4-6 SECOND BLAST FOLLOWED BY TWO ONE-SECOND BLASTS AT LEAST ONCE PER MINUTE.

15.	Text & Fig 20-4	413-414	Situation: Your ship meets another ship to starboard and wishes to pass. In which direction is the passing made and what message is sounded?

STARBOARD TO STARBOARD (TO RIGHT) AND TWO SHORT BLASTS.

16.	Text & Table	135	Situation: You are on evening watch. You are told to report to your chief at 4 bells and at 8 bells. At what times will you report?

(a) 6:00 & 8:00 (b) 1800 & 2000

APPENDIX B

NAVY READING TASK TEST/INVENTORY:
RESULTS OF EXPLORATORY STUDY

Note--Last-minute changes in the NRTT/I, and the discovery that an edition of The Bluejackets' Manual different from that used in the present study was being used by Navy personnel, resulted in some items being omitted from either the NRTT or NRTI studies.

Index

References to illustrations are printed in boldface type

B-1

NAVY READING TASK TEST/INVENTORY — RESULTS OF EXPLORATORY STUDY

Type of Task: Index — Item 1: Locating Information Directly Given in Index
Item 2: Locating Information Indirectly Given in Index
Item 3: Locating Subordinated Information

Questions:
Using only the Index, give the page number(s) where you could find the following items.

1. Yi
2. Rigging wire rope
3. Precautions when handling ammunition

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

		READING GRADE LEVEL								
		6	7	8	9	10	11	12	13	14
Item	N	26	26	21	25	41	14	28	16	50
1	%	88	89	91	84	100	93	100	94	98
2	%	85	85	86	76	88	93	89	81	98
3	%	62	77	91	88	90	100	93	88	98

Inventory Results: Frequency with which this type of material is used.

Rating	1 1 to 3 times a year	2 1 time each month	3 2 to 3 times a month	4 1 or more times each week	5 Daily	Not Used
Electronics Technician				X		
Electrician's Mate				X		
Gunner's Mate		X				
Boatswain's Mate	X					

ENLISTED DETAILS

There are many jobs involving work and responsibilities which are not covered by any particular rating description. Men may be detailed to these jobs by a division officer, department head, or the executive officer.

Beach Guard (In Port)

He is a petty officer detailed to control boat traffic and help maintain order at a fleet landing during liberty hours.

Chief of the Boat

He is the senior enlisted man in a submarine, and reports direct to the executive officer. (See Chapter 11.)

Compartment Cleaners

They are non-rated men, detailed by their division officers, to be responsible for cleanliness and good order of their assigned compartments. They do not stand watches, but take part in all drills.

Division Police Petty Officer

These men are assistants to the ship's master-at-arms, and perform their duties in that part of the ship for which their division is responsible. The DPPO makes taps and reveille in his own division spaces, turns standing lights on at sunset and off at reveille, and directs traffic and clears the compartments during drills

Fresh Water King

He is an engineering department petty officer in charge of the ship's evaporators.

Guard Mail Petty Officer (In Port)

He is a man detailed to carry official mail between the ship and other ships and commands (see Chapter 10)

NAVY READING TASK TEST/INVENTORY — RESULTS OF EXPLORATORY STUDY

Type of Task: Finding Facts in Texts (Form E, Item 7)

Question: In assigning enlisted details, who serve as assistants to the ship's master-at-arms?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

	READING GRADE LEVEL									
	6	7	8	9	10	11	12	13	14	TOTAL
N	10	8	7	6	11	8	7	6	17	82
%	60	62	71	88	91	62	57	100	100	79

Inventory Results: Frequency with which this type of task is performed.

	1 1 to 3 times a year	2 1 time each month	3 2 to 3 times a month	4 1 or more times each week	5 Daily	Not Used
Electronics Technician			X			
Electrician's Mate			X			
Gunner's Mate						X
Boatswain's Mate						X

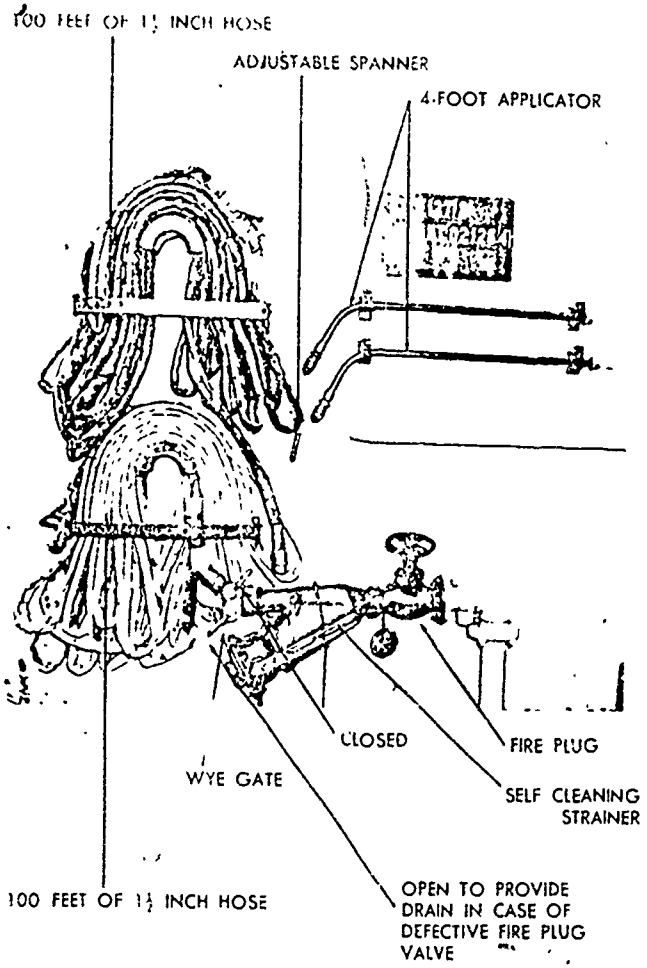


Figure 15 7 Standard shipboard installation of fire plug, strainer, and hose sections. Note lower valve on wye gate is open to provide drain in case of defective fire plug valve

NAVY READING TASK TEST/INVENTORY — RESULTS OF EXPLORATORY STUDY

Type of Task: Finding Facts in Figures (Form E, Item 8)

Question: How many 100-ft hose sections are included in a standard shipboard fire plug installation?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

	READING GRADE LEVEL									
	6	7	8	9	10	11	12	13	14	TOTAL
N	10	8	7	8	11	8	7	6	17	82
%	80	50	71	62	91	75	86	83	94	79

Inventory Results: Frequency with which this type of task is performed.

	1	2	3	4	5	
	1 to 3 times a year	1 time each month	2 to 3 times a month	1 or more times each week	Daily	Not Used
Electronics Technician			X			
Electrician's Mate					X	
Gunner's Mate				X		
Boatswain's Mate		X				

NAVY READING TASK TEST/INVENTORY — RESULTS OF EXPLORATORY STUDY

Type of Task: Finding Facts in Tables (Form E, Item 9)

Question: What is the weight of the M16 rifle?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

	READING GRADE LEVEL									
	6	7	8	9	10	11	12	13	14	TOTAL
N	10	8	7	8	11	8	7	6	17	82
%	90	100	100	100	100	88	100	100	100	98

Inventory Results: Frequency with which this type of task is performed.

	1	2	3	4	5	
	1 to 3 times a year	1 time each month	2 to 3 times a month	1 or more times each week	Daily	Not Used
Electronics Technician	(omitted)					
Electrician's Mate					X	
Gunner's Mate					X	
Boatswain's Mate						X

SMALL ARMS TABLE

Model	Caliber	Capacity	Weight	Barrel Length	Type of Action	Max Range	Effective Range
PISTOL M1911A1	45 cal	7 rounds magazine	2 1/2 lbs	5 inches	semiautomatic	1600 yds	55 yds
REVOLVER 38 CAL	.38 Special	6 rounds	1 1/2 lbs	4 inches	single/double action	1600 yds	50 yds
M14 RIFLE	7 62 mm	20 rounds magazine	10 lbs	22 inches	semiautomatic/ automatic	5000 yds	500yds
M16 RIFLE	5.56 mm	20 rounds magazine	7 1/2 lbs	20 inches	semiautomatic/ automatic	2900 yds	500 yds
SHOTGUN	12 gauge	5 rounds	7 1/2 lbs	20 inches various	pump	748 yds	40-50 yds
MACHINE GUN M2	.50 cal	50 or 300 round belt	84 lbs	45 inches	semiautomatic/ automatic	7400 yds	2250 yds
MACHINE GUN M60	7 62 mm	100 rounds belt	22 lbs	24 inches	automatic	3200 meters	1100 meters
LINE THROWING GUN	.45 cal Blank	single Shot	N/A	N/A	N/A	100 yds	100 yds

NAVY READING TASK TEST/INVENTORY — RESULTS OF EXPLORATORY STUDY

Type of Task: Finding Facts in Texts and Figures (Form E, Item 10)

Question: When using a spray painting gun, how far from the surface should the gun be held?

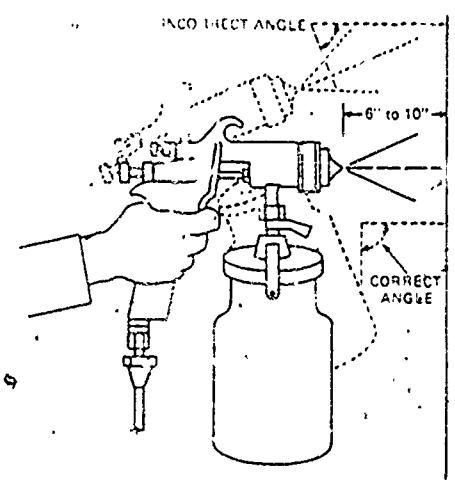
Test Results: Percentage of personnel at each reading grade level who got the correct answer.

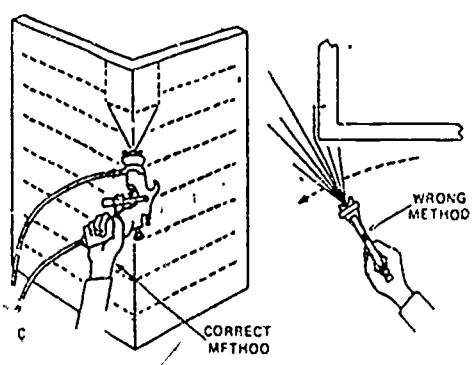
READING GRADE LEVEL

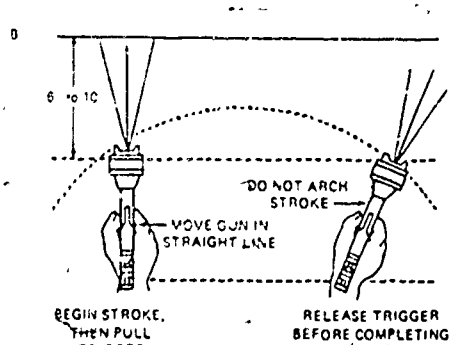
	6	7	8	9	10	11	12	13	14	TOTAL
N	10	8	7	8	11	8	7	6	17	82
%	90	88	100	100	100	100	100	100	94	96

Inventory Results: Frequency with which this type of task is performed.

	1	2	3	4	5	
	1 to 3 times a year	1 time each month	2 to 3 times a month	1 or more times each week	Daily	Not Used
Electronics Technician			X			
Electrician's Mate				X		
Gunner's Mate						X
Boatswain's Mate	X					







screw. If a wide pattern is used, the flow of paint is increased accordingly with the fluid control screw. Follow these rules in spray painting

Before starting to spray, test the gun on a surface similar to the one you will work on

Use the minimum pressure for the job and hold the gun from six to ten inches from the surface.

Hold the gun perpendicular to the surface and at a constant distance at all times on the strokes Start the stroke before squeezing the trigger, and release it before finishing the stroke

Spray up to within one or two inches of a corner and stop. Then turn the gun sideways and spray downwards, spraying both sides at once.

If small pieces protrude from a large area being painted, paint them first, and then do the entire area.

Thoroughly clean the spray gun, paint container, and hoses after each use, as described in the training course for Boatswain Mate 3 & 2

All ships are assigned *designations*—a group of letters which indicate their type and general uses—and *hull numbers*, which are usually assigned in sequence to ships of a type as they are built. These identifying designations are used in correspondence, records, plans, communications, and sometimes on ships' boats, because letter and number designations are shorter than the ship's names—*Mission Capistrano*, (AG 162)—and help to avoid confusion between such similar names as *Horne* (DLG 30) and *Hornet* (CVS 12) or *Phoebe* (SC 199) and *Phoebus* (YF 294).

The first letter in a designator is a general classification: *D* for destroyers, *S* for submarines, *L* for amphibious vessels, *M* for minewarfare vessels, *A* for auxiliaries, *W* for Coast Guard vessels, *T* for Military Sealift Command ships, and *Y* for service and yard craft. In combatant designations, the letter *N* means nuclear powered and *G* means the ship is equipped to fire guided missiles. A listing of most ship designations follows, minor yard craft and service craft have been omitted.

AD	Destroyer Tender		
ADG	Degaussing Ship	AKR	Vehicle Cargo Ship
AE	Ammunition Ship	ANL	Stores Issue Ship
AF	Store Ship	AO	Net Laying Ship
AFS	Combat Store Ship	AOE	Oiler
AG	Miscellaneous	AOG	Fast Combat Support Ship
AGDE	Escort Research Ship	AOR	Gasoline Tanker
AGEH	Hydrofoil Research Ship	AP	Replenishment Oiler
AGER	Environmental Research Ship	AR	Transport
		ARS	Repair Ship, Salvage Ship
AFG	Miscellaneous Command Ship	AS	Submarine Tender
		ASPB	Assault Support Patrol Boat
AGM	Missile Range Instrumentation Ship	ASR	Submarine Rescue Ship
		ATA	Auxiliary Ocean Tug
AGMR	Major Communications Relay Ship	ATC	Armored Troop Carrier
		ATF	Fleet Ocean Tug
AGOR	Oceanographic Research Ship	ATS	Salvage and Rescue Ship
		AV	Seaplane Tender
AGP	Patrol Craft Tender	AVM	Guided Missile Ship
AGS	Surveying Ship	CA	Heavy Cruiser
AGSS	Auxiliary Submarine	CC	Command Ship
AGTR	Technical Research Ship	CCB	Command and Control Boat
AH	Hospital Ship	CG, CGN	Guided Missile Cruiser
AK	Cargo Ship	CL	Light Cruiser
AKD	Cargo Ship Dock	CLG	Guided Missile Light Cruiser
AKL	Light Cargo Ship		

NAVY READING TASK TEST/INVENTORY — RESULTS OF EXPLORATORY STUDY

Type of Task: Finding Facts in Texts and Tables (Form E, Item 11)

Question: What does the general ship classification for a seaplane tender mean?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

	READING GRADE LEVEL										
	1	6	7	8	9	10	11	12	13	14	TOTAL
N	NOT ADMINISTERED										
%											

Inventory Results: Frequency with which this type of task is performed.

	1	2	3	4	5	
	1 to 3 times a year	1 time each month	2 to 3 times a month	1 or more times each week	Daily	Not Used
Electronics Technician	X					
Electrician's Mate				X		
Gunner's Mate	X					
Boatswain's Mate						X

Heatstroke (Sunstroke)

Heatstroke and heat exhaustion are caused by excessive exposure to desert or jungle heat, direct rays of the sun, or heat of machinery spaces, foundries, bakeries, etc. Under similar circumstances, one person may develop heatstroke and another heat exhaustion. There are important differences between the two afflictions.

Each represents a *different* bodily reaction to excessive heat, and for this reason the symptoms and treatment are also different.

Heatstroke results from a failure of the heat-regulating mechanism of the body. The body becomes overheated, the temperature rises to between 105 and 110 degrees Farenheit, but there is no sweating or cooling of the body. The victim's skin is hot, dry, and red; he may have preliminary symptoms such as headache, nausea, dizziness, or weakness; but very often the first signs are sudden collapse and loss of consciousness. Breathing is likely to be deep and rapid. The pulse is strong and fast. Convulsions may occur. Heatstroke may cause death or permanent disability; at best, recovery is likely to be slow, and complicated by relapses.

The longer the victim remains overheated, the more likely he is to die. These are first aid measures to immediately lower body temperature.

Move the victim to a cool place, remove his clothing, and place him on his back with head and shoulders slightly raised.

Sponge or, spray his body with cold water, and fan him so the water will evaporate rapidly.

When he regains consciousness, give him cool (not cold) water to drink. Don't give stimulants or hot drinks.

Get him to a medical facility as soon as possible. Keep him cool while he is being transported.

NAVY READING TASK TEST/INVENTORY – RESULTS OF EXPLORATORY STUDY

Type of Task: Following Directions Using Texts (Form E, Item 12)

Question: Situation – You are treating an unconscious person for heatstroke. You have moved the person to a cool place and removed his clothing.

What else should you do before you spray his body with cold water?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

	READING GRADE LEVEL									
	6	7	8	9	10	11	12	13	14	TOTAL
N	10	8	7	8	11	8	7	6	17	82
%	70	88	100	88	91	100	86	83	100	90

Inventory Results: Frequency with which this type of task is performed.

	1 1 to 3 times a year	2 1 time each month	3 2 to 3 times a month	4 1 or more times each week	5 Daily	Not Used
Electronics Technician			X			
Electrician's Mate					X	
Gunner's Mate						X
Boatswain's Mate						X

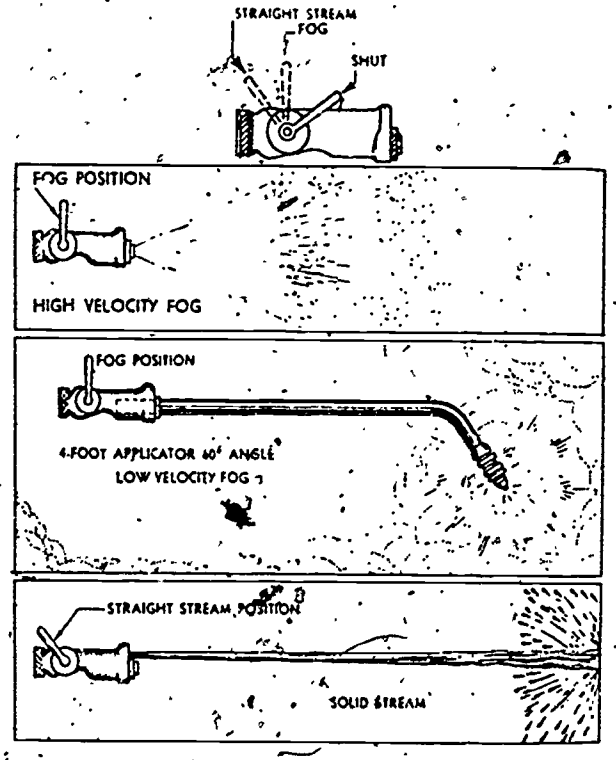


Figure 15-8 All-purpose hose nozzle in use for high velocity fog, low velocity fog, and straight stream.

NAVY READING TASK TEST/INVENTORY – RESULTS OF EXPLORATORY STUDY

Type of Task: Following Directions Using Figures (Form E, Item 13)

Question: Situation – You are fighting a fire using an all-purpose hose nozzle in the high velocity fog position. You have just received orders to use low velocity fog on the fire. After you have turned off the water by moving the lever to the "SHUT" position,
What two things must be done to get low velocity fog?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

	READING GRADE LEVEL									
	6	7	8	9	10	11	12	13	14	TOTAL
N	10	8	7	8	11	8	7	6	17	82
%	20	25	14	38	55	62	57	67	59	45

Inventory Results: Frequency with which this type of task is performed.

	1 1 to 3 times a year	2 1 time each month	3 2 to 3 times a month	4 1 or more times each week	5 Daily	Not Used
Electronics Technician		X				
Electrician's Mate				X		
Gunner's Mate		X				
Boatswain's Mate				X		

OWNERSHIP MARKINGS

Articles of clothing shall be legibly marked with the owner's name and SSN using black marking fluid for marking white clothes and chambray shirts; white marking fluid for marking blue clothes and dungaree trousers; or indelible ink when labels are provided for the purpose. All markings other than those on labels shall be made with a one-half inch stencil or stamp, if available, but not larger than one inch.

Recruits are furnished detailed instructions on marking clothes at the time of issue. These instructions must be followed explicitly. As a general rule, the instructions for marking clothes, as laid down in *Uniform Regulations*, should be followed when additional uniform equipment is obtained.

The word "right" or "left" means the right or left when wearing the garment. On towels, it means the owner's right or left when standing behind the article laid out for inspection. Markings on all articles, when properly rolled or laid out for bag inspection, will appear right side up to the inspecting officer and upside down to the person standing behind them.

Men

Bag (duffel)—Along the carrying strap on outer side, and on opposite side from the carrying strap, around the bag about one foot from the top.
Belts—Inside.
Cap, blue working—Initials only on the sweatband.
Cap, knit (watch)—On label, inside, one-half inch from the bottom.
Coat (peacoat)—On the lining, right side of slit of tail three inches from and parallel to bottom.
Drawers—Outside of the right half of the waistband, or immediately underneath the waistband on drawers with elastic waistbands.
Gloves—Initials only, inside, near the top.
Hat, white—Outside of the brim, when brim is turned down, sufficiently close to the crown that marking will not show when brim is turned up.
Jacket, blue working—Inside of hem at the right of the center line of the back.
Jumpers, blue and white—Inside of hem at the right of the center line of the back.
Neckerchief—Diagonally across center.
Raincoat—Inside on lining, three inches below collar seam.
Shirt, blue chambray—On shirt tail; last name only on left front, one inch above pocket.
Shirt, white tropical—Vertically, beginning one inch from the bottom on the inner side of the right front fold on which the buttons are sewed.
Shoes—Initials only inside, near top.
Socks—Initials only on the foot.

NAVY READING TASK TEST/INVENTORY — RESULTS OF EXPLORATORY STUDY

Type of Task: Following Directions Using Tables (Form E, Item 14)

Question: Situation — You have been given instructions to check all clothes to make sure they are marked in the right way. When checking, you find out that your raincoat has not been marked.

Where should your raincoat be marked?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

	READING GRADE LEVEL									
	6	7	8	9	10	11	12	13	14	TOTAL
N	10	8	7	8	11	8	7	6	17	82
%	90	100	100	100	91	100	86	83	100	95

Inventory Results: Frequency with which this type of task is performed.

	1	2	3	4	5	
	1 to 3 times a year	1 time each month	2 to 3 times a month	1 or more times each week	Daily	Not Used
Electronics Technician			X			
Electrician's Mate				X		
Gunner's Mate						X
Boatswain's Mate	X					

All ships are assigned *designations*—a group of letters which indicate their type and general use—and *hull numbers*, which are usually assigned in sequence to ships of a type as they are built. These identifying designations are used in correspondence, records, plans, communications, and sometimes on ships' boats, because letter and number designations are shorter than the ship's names—*Mission Capistrano*, (AG 162)—and help to avoid confusion between such similar names as *Horne* (DLG 30) and *Hornet* (CVS 12) or *Phoebe* (MSC 199) and *Phoebus* (YF 294).

The first letter in a designator is a general classification: *D* for destroyers, *S* for submarines, *L* for amphibious vessels, *M* for minewarfare vessels, *A* for auxiliaries, *W* for Coast Guard vessels, *T* for Military Sealift Command ships, and *Y* for service and yard craft. In combatant designations, the letter *N* means nuclear powered and *G* means the ship is equipped to fire guided missiles. A listing of most ship designations follows; minor yard craft and service craft have been omitted.

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AF	Store Ship
AFS	Combat Store Ship
AG	Miscellaneous
AGDE	Escort Research Ship
AGEH	Hydrofoil Research Ship
AGER	Environmental Research Ship
AFG	Miscellaneous Command Ship
AGM	Missile Range Instrumentation Ship
AGMR	Major Communications Relay Ship
AGOR	Oceanographic Research Ship
AGP	Patrol Craft Tender
AGS	Surveying Ship
AGSS	Auxiliary Submarine
AGTR	Technical Research Ship
AH	Hospital Ship
AK	Cargo Ship
AKD	Cargo Ship Dock
AKL	Light Cargo Ship
AKR	Vehicle Cargo Ship
ANL	Stores Issue Ship
AO	Net Laying Ship
AOE	Oiler
AOG	Fast Combat Support Ship
AOR	Gasoline Tanker
AP	Replenishment Oiler
AR	Transport
ARS	Repair Ship, Salvage Ship
AS	Submarine Tender
ASPB	Assault Support Patrol Boat
ASR	Submarine Rescue Ship
ATA	Auxiliary Ocean Tug
ATC	Armored Troop Carrier
ATF	Fleet Ocean Tug
ATS	Salvage and Rescue Ship
AV	Seaplane Tender
AVM	Guided Missile Ship
CA	Heavy Cruiser
CC	Command Ship
CCB	Command and Control Boat
CG, CGN	Guided Missile Cruiser
CL	Light Cruiser
CLG	Guided Missile Light Cruiser

NAVY READING TASK TEST/INVENTORY — RESULTS OF EXPLORATORY STUDY

Type of Task: Following Directions Using Texts and Tables (Form E, Item 16)

Question: Situation — You are on watch and have been told to report all ships that you see. When reporting, you have been told to first give the ship's general classification and then the designation. You have sighted a light cargo ship.

What do you report?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

	READING GRADE LEVEL									
	6	7	8	9	10	11	12	13	14	TOTAL
N	10	8	7	8	11	8	7	6	17	82
%	40	50	86	62	55	62	71	83	82	66

Inventory Results: Frequency with which this type of task is performed.

	1	2	3	4	5	
	1 to 3 times a year	1 time each month	2 to 3 times a month	1 or more times each week	Daily	Not Used
Electronics Technician		X				
Electrician's Mate				X		
Gunner's Mate						X
Boatswain's Mate						X

B-11

SHIPBOARD WEAPONS CONTROL

Any weapon to be effective must be able to deliver a destructive device to a target. For accuracy, the exact location of the target must be known, and for a moving target, the velocity and direction of travel. Since many aircraft and missiles travel faster than the speed of sound, a weapon must be able to hit them at great distances. Against such targets, a weapon is most effective when it is used as part of a weapon system.

A weapon system is defined as the combination of a weapon (or multiple weapons) and the equipment used to bring the weapon's destructive power against any enemy. The weapons system includes:

Units that detect, locate, and identify the target; search radars, optical target designation transmitters, and IFF radar (Identification, Friend or Foe).

Units that deliver or initiate delivery of the weapon to the target—guns, missile launcher.

Units that direct or aim the delivery unit—gun and guided missile radar and directors; computer devices (rangekeepers and computers); display units (electronic, electromechanical, or optical devices); reference devices (stable elements) to establish reference planes and lines to stabilize lines of fire and lines of sight.

Units that will destroy the target when contact is made, or when near the target—shells, missiles, torpedoes.

The primary mission of a weapons system is to destroy the enemy or a practice target. To accomplish its mission, it goes through this procedure:

NAVY READING-TASK TEST/INVENTORY — RESULTS OF EXPLORATORY STUDY

Type of Task: Finding Facts in Texts (Form M, Item 7)

Question: In target detection, what does IFF mean?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

	READING GRADE LEVEL									
	6	7	8	9	10	11	12	13	14	TOTAL
N	6	10	5	9	19	3	6	5	18	81
%	100	90	100	100	100	100	83	100	100	98

Inventory Results: Frequency with which this type of task is performed.

	1 1 to 3 times a year	2 1 time each month	3 2 to 3 times a month	4 1 or more times each week	5 Daily	Not Used
Electronics Technician	X					
Electrician's Mate				X		
Gunner's Mate					X	
Boatswain's Mate						X

POWER VESSELS UNDER WAY

LIGHTS			SHAPES	
LIGHT	INTERNATIONAL RULES	U.S. INLAND WATERS	INT'NATL RULES	U.S. INL. WATERS
MASTHEAD	1 W/20		POWER VESSEL PROCEEDING UNDER SAIL	NONE
RANGE	1 W/20	1 W/32		
SIDE	1 R,G/10			
STERN	1 W/12	WHEN REQUIRED	BLACK CONE	

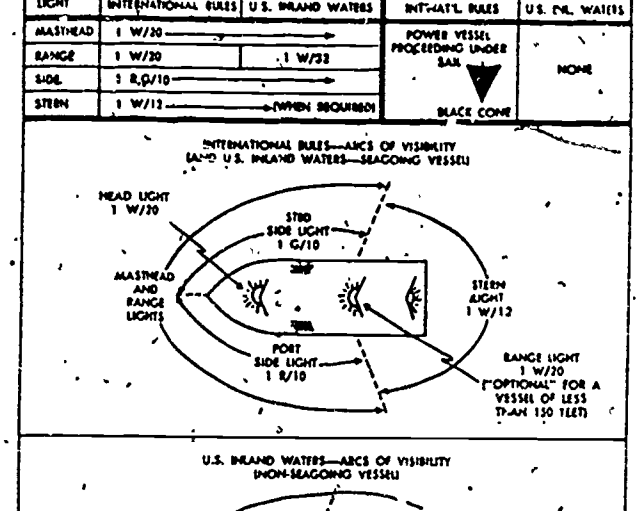


Figure 20-2 Navigational lights required for power vessels under way, showing colors and arc of visibility.

NAVY READING TASK TEST/INVENTORY — RESULTS OF EXPLORATORY STUDY

Type of Task: Finding Facts in Figures (Form M, Item 8).

Question: How many white navigational lights are required for a 200-ft power vessel underway under international rules?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

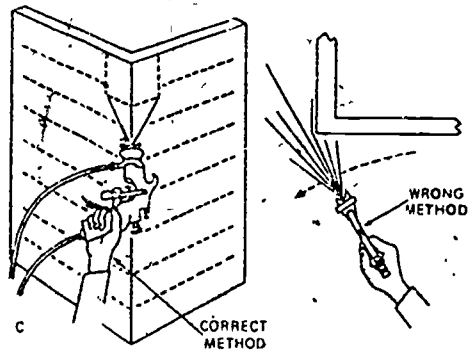
	READING GRADE LEVEL									
	6	7	8	9	10	11	12	13	14	TOTAL
N	6	10	5	9	19	3	6	5	18	81
%	50	40	60	56	68	33	50	20	56	53

Inventory Results: Frequency with which this type of task is performed.

	1	2	3	4	5	
	1 to 3 times a year	1 time each month	2 to 3 times a month	1 or more times each week	Daily	Not Used
Electronics Technician		X				
Electrician's Mate				X		
Gunner's Mate						X
Boatswain's Mate						X

Spray Painting Techniques

Paint is shot out of the nozzle in a thin jet, and compressed air spreads it in a fine spray. The spray pattern is changed by adjusting the air control



screw. If a wide pattern is used, the flow of paint is increased accordingly with the fluid control screw. Follow these rules in spray painting:

Before starting to spray, test the gun on a surface similar to the one you will work on.

Use the minimum pressure for the job and hold the gun from six to ten inches from the surface.

Hold the gun perpendicular to the surface and at a constant distance at all times on the strokes. Start the stroke before squeezing the trigger, and release it before finishing the stroke.

Spray up to within one or two inches of a corner and stop. Then turn the gun sideways and spray downwards, spraying both sides at once.

If small pieces protrude from a large area being painted, paint them first, and then do the entire area.

Thoroughly clean the spray gun, paint container, and hose after each use, as described in the training course for Boatswain Mate 3 & 2

NAVY READING TASK TEST/INVENTORY — RESULTS OF EXPLORATORY STUDY

Type of Task: Following Directions Using Text & Figures (Form E, Item 15)

Question: Situation — You were asked to paint a small building using a spray-painting gun. You have painted the entire building except for the corners.

How should the corners be painted?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

	READING GRADE LEVEL									
	6	7	8	9	10	11	12	13	14	TOTAL
N	10	8	7	8	11	8	7	6	17	82
%	60	75	86	100	100	100	86	100	94	89

Inventory Results: Frequency with which this type of task is performed.

	1	2	3	4	5	
	1 to 3 times a year	1 time each month	2 to 3 times a month	1 or more times each week	Daily	Not Used
Electronics Technician		X				
Electrician's Mate				X		
Gunner's Mate						X
Boatswain's Mate			X			

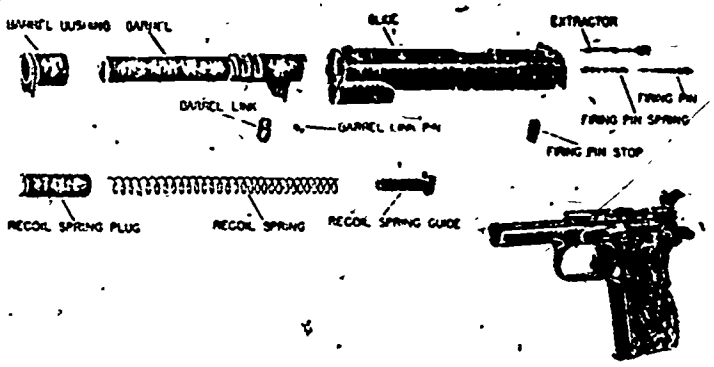


Figure 13-7 Automatic pistol in field stripped condition

Proper care of the pistol is a requirement of the user, and the following steps outline the procedure for field stripping the weapon for maintenance (figure 13-7).

Clear the weapon of all ammunition.

Push in magazine catch to remove magazine.

Cock the hammer and push the safety lock up to the safe position. Push the recoil spring plug in and turn the barrel bushing about a quarter turn clockwise while holding the recoil spring plug inward. Slowly release the pressure on the recoil spring plug, removing it from the gun. Return the safety lock to the fire position.

Pull slide rearward until the projection on the slide stop is directly below the half-moon recess on the slide. Push the slide stop out from right to left using finger pressure.

Holding pistol upside down, draw the receiver to the rear, removing it from the slide. Lay the receiver on a padded surface—don't let it fall on deck.

Remove the recoil spring and guide out the rear of the slide. Remove barrel bushing by turning counterclockwise as far as it will go, then pull out with your fingers.

Tilt slide, upside down, downward and pull barrel out the muzzle end of the slide.

NAVY READING TASK TEST/INVENTORY — RESULTS OF EXPLORATORY STUDY

Type of Task: Finding Facts in Texts and Figures (Form M, Item 10)

Question: When stripping a .45 caliber pistol, what must be removed from the muzzle end of the barrel?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

	READING GRADE LEVEL									
	6	7	8	9	10	11	12	13	14	TOTAL
N	6	10	5	9	19	3	6	5	18	81
%	33	50	0	89	47	33	50	60	56	51

Inventory Results: Frequency with which this type of task is performed.

	1 1 to 3 times a year	2 1 time each month	3 2 to 3 times a month	4 1 or more times each week	5 Daily	Not Used
Electronics Technician			X			
Electrician's Mate				X		
Gunner's Mate					X	
Boatswain's Mate						X

MEANING ON INLAND WATERS	WHISTLE SIGNAL	MEANING ON INTERNATIONAL WATERS
I intend to direct my course to my own Starboard (and to leave you on my Port side) Or in a crossing situation by the privileged vessel: I intend to maintain my course and speed.	1 Short Blast	I am altering my course to starboard
I intend to direct my course to my own Port you on my starboard side).	2 Short Blasts.	I am altering my course to port. (and to leave
My engines are going at full speed astern. (Court decisions have held that this signal should also be used when engines are going astern less than full or when a ship has sternway)	3 Short Blasts	My engines are going astern. (Court decisions have held this signal legal to indicate the ship has sternway)
Danger Signal. I fail to understand your course or intention. I do not believe the proposed course of action is safe	4 or more Short Blasts	
	5 or more Short Blasts	Danger Signal. I (the privileged vessel) doubt that you are taking sufficient action to avert collision: (Cannot be given by burdened vessel.)

NOTE: Except for the danger signal on inland waters, these signals may only be sounded when vessels are in sight (visually) of one another.

B-15

NAVY READING TASK TEST/INVENTORY — RESULTS OF EXPLORATORY STUDY

Type of Task: Finding Facts in Tables (Form M, Item 9)

Question: What does three short blasts of a whistle mean in international waters?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

	READING GRADE LEVEL									
	6	7	8	9	10	11	12	13	14	TOTAL
N	6	10	5	9	19	3	6	5	18	81
%	83	90	100	100	95	100	100	100	100	96

Inventory Results: Frequency with which this type of task is performed.

	1 1 to 3 times a year	2 1 time each month	3 2 to 3 times a month	4 1 or more times each week	5 Daily	Not Used
Electronics Technician						
Electrician's Mate						
Gunner's Mate						
Boatswain's Mate						

NOT RATED

Anchor Chains **These are made of steel, and the size varies according to** the size of the ship and its anchors. Chain comes in 15-fathom lengths (90 feet) called shots. A destroyer will have one eight-shot chain and one seven-shot chain. Shots are connected by detachable links; these links, and their adjacent links, are painted red, white or blue, to help the anchor detail know how much chain has run out. Each link of the next-to-last shot is painted yellow; the entire last shot is red. This is to warn that the bitter end of the chain is coming up. When an anchor is hoisted, the chain comes off the anchor windlass and into the chain locker.

Shot Number	Color of Detachable Link	Number of Adjacent Links Painted White	Turns of Wire on Last White Links
1 (15 fathoms)	Red	1	1
2 (30 fathoms)	White	2	2
3 (45 fathoms)	Blue	3	3
4 (60 fathoms)	Red	4	4
5 (75 fathoms)	White	5	5
6 (90 fathoms)	Blue	6	6

B-16

NAVY READING TASK TEST/INVENTORY — RESULTS OF EXPLORATORY STUDY

Type of Task: Finding Facts in Texts and Tables (Form M, Item 11)

Question: How many fathoms of chain are in a 4 shot anchor chain?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

	READING GRADE LEVEL									
	6	7	8	9	10	11	12	13	14	TOTAL
N	6	10	5	9	19	3	6	5	18	81
%	83	90	100	89	89	67	100	100	100	93

Inventory Results: Frequency with which this type of task is performed.

	1 1 to 3 times a year	2 1 time each month	3 2 to 3 times a month	4 1 or more times each week	5 Daily	Not Used
Electronics Technician		X				
Electrician's Mate				X		
Gunner's Mate						X
Boatswain's Mate		X				

Radiation Hazards (RadHaz)

The power generated by electronic equipment can result in biological injury to men. Where such danger is possible, an *r-f (radio frequency) radiation hazard* exists, and *warning* must be posted.

Before a man goes aloft to work on masts or stacks, he must obtain permission from the OOD. He will usually have to have a chit stating that radio and radar transmitters have been secured and tagged, "secured, men aloft." The following specific precautions must be observed to avoid hazardous intensity levels.

No visual inspection of any opening, such as a wave guide, that emits r-f energy is allowed unless the equipment is definitely secured for inspection.

Operating and maintenance men must inspect all r-f hazard signs posted in the operating area to ensure that the equipment is operating in such a manner that nearby personnel are not subjected to hazardous radiation.

All personnel must be aware of and observe r-f warning signs in a specific area.

When the possibility of accidental exposure exists while the antenna is radiating, a man must be stationed topside, within view of the antenna (but well out of the beam), and in communication with the operator.

Radiation hazard warning signs must be permanently posted and also used to temporarily restrict access to certain parts of the ship where equipment is radiating.

NAVY READING TASK TEST/INVENTORY – RESULTS OF EXPLORATORY STUDY

Type of Task: Following Directions Using Texts (Form M, Item 12)

Question: Situation – You have been asked to go aloft to work on the masts and stacks. You have read your work assignment and are about ready to go aloft.

What else must you do before you go aloft?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

	READING GRADE LEVEL									
	6	7	8	9	10	11	12	13	14	TOTAL
N	6	10	5	9	19	3	6	5	18	81
%	50	90	80	89	84	100	83	100	89	85

Inventory Results: Frequency with which this type of task is performed.

	1 1 to 3 times a year	2 1 time each month	3 2 to 3 times a month	4 1 or more times each week	5 Daily	Not Used
Electronics Technician	X					
Electrician's Mate				X		
Gunner's Mate						X
Boatswain's Mate						X

B-18

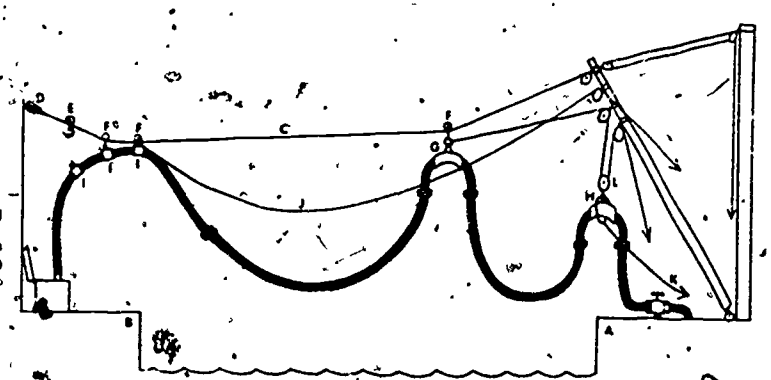


Figure 1 - 25 Fueling at sea, all-wire span method. A. delivering ship, B. receiving ship, C. wire span, D. jelicon hook, E. free trolley, F. trolley, G. outboard saddle, H. inboard saddle, I. hose clamps, J. retrieving wire, K. wire pendant, L. wire saddle whip

NAVY READING TASK TEST/INVENTORY — RESULTS OF EXPLORATORY STUDY

Type of Task: Following Directions Using Figures (Form M, Item 13)

Question: Situation — You are on a delivery ship rigging an all-wire span for fueling at sea. You have attached the tolleys and the free trolley to the wire span.

What else must you attach to the wire span?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

	READING GRADE LEVEL									
	6	7	8	9	10	11	12	13	14	TOTAL
N	6	10	5	9	19	3	6	5	18	81
%	33	10	20	44	63	67	67	20	56	46

Inventory Results: Frequency with which this type of task is performed.

	1 1 to 3 times a year	2 1 time each month	3 2 to 3 times a month	4 1 or more times each week	5 Daily	Not Used
Electronics Technician						
Electrician's Mate						
Gunner's Mate		NOT RATED				
Boatswain's Mate						

Characteristics and Capacities of Boats

Type	Length	Beam	Hoisting weight (1)	Cargo capacity (2)	Personnel capacity (3)
MWB (Mk6)	26	8	6,500	3,300	20
UB	26	9	7,900	3,500	22
PERS (Mk6)	28	11	11,700	2,800	17
MB	35	9	13,500	3,700	23
ML	40	11	16,300	11,700	71
UB	50	14	23,300	24,000	146
ML	50	13	23,300	24,000	145
LCVP	36	11	18,500	8,100	36 (4)
LCM6	56	14	56,000	68,000	120 (4)
LCM8	73	21	134,000	120,000	200 (4)

1 Boat ready for service, fueled, outfit and crew on board
2 To nearest 100 pounds below capacity
3 Not counting crew
4 Combat-equipped troops at 225 pounds each

NAVY READING TASK TEST/INVENTORY – RESULTS OF EXPLORATORY STUDY

Type of Task: Following Directions Using Tables (Form M, Item 14)

Question: Situation – You are in charge of loading personnel on LCVPs. The four crew members are already in the boat. If you load the boat to capacity with combat-equipped troops,

What will be the total number of personnel you can put in the boat?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

	READING GRADE LEVEL									
	6	7	8	9	10	11	12	13	14	TOTAL
N	6	10	5	9	19	3	6	5	18	81
%	67	50	40	67	79	100	67	60	72	68

Inventory Results: Frequency with which this type of task is performed.

	1 1 to 3 times a year	2 1 time each month	3 2 to 3 times a month	4 1 or more times each week	5 Daily	Not Used
Electronics Technician						
Electrician's Mate						
Gunner's Mate			NOT RATED			
Boatswain's Mate						

A permanent whipping is put on with a **palm and needle**, threaded with sail twine, *doubled*. (Figure 18-4 shows single twine for clearness.) Shove the needle through the middle of a strand so that it comes out between two strands on the other side. Bind the end down with six or eight turns wound on from inboard toward the end, and again push the needle through the middle of a strand near the end so that it comes out between two strands. Then work up and down between strands, with a cross-seizing between each pair. Pull each cross-seizing good and tight. The needle comes out in the middle of a strand on the last shove through, so the strand will hold the end after you cut the sail twine.

Seizings Seizings (pronounced seezings) are used to help hold a line loop around a thimble, retain a loop in the middle of a line, hold the short end of a hitch or bend to the main body of a line, or fasten two sister hooks

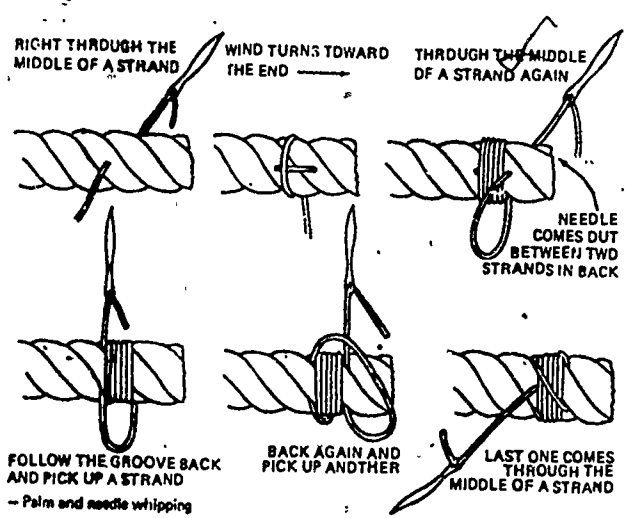


Figure 18-4 Whipping a line. With palm and needle, double the twine. Single twine shown here for clearness only.

B-20

NAVY READING TASK TEST/INVENTORY — RESULTS OF EXPLORATORY STUDY

Type of Task: Following Directions Using Texts and Figures (Form M, Item 15)

Question: Situation — You are putting a permanent whip on a line. You have finished binding and are working on the last cross-seize.

How do you finish whipping the line?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

	READING GRADE LEVEL									
	6	7	8	9	10	11	12	13	14	TOTAL
N	6	10	5	9	19	3	6	5	18	81
%	33	60	80	67	84	67	100	80	83	75

Inventory Results: Frequency with which this type of task is performed.

	1	2	3	4	5	
	1 to 3 times a year	1 time each month	2 to 3 times a month	1 or more times each week	Daily	Not Used
Electronics Technician	X					
Electrician's Mate				X		
Gunner's Mate						X
Boatswain's Mate				X		

MERCHANT SHIP CLASSIFICATION SYSTEM

Many merchant ships have been taken over by the Navy and commissioned as AF, AE, LKA, and LPA types. The ship's plans and other papers will carry Maritime Administration (MARAD) classification numbers, which are confusing to most Navy men, but should be understood.

A merchant ship designation consists of three groups of letters and numbers. The first two groups indicate the type of ship, approximate length, type of power plants, number of screws, and passenger capacity. The third indicates particular design and modifications—the "model number." The first two parts of a merchant ship designation are derived as follows:

Vessel type	Length in feet						
	1	2	3	4	5	6	7
C-cargo	under 400	400 450	450 500	500 550			
P-passenger	under 500	500 600	600 700	700 800	800 900	900 1000	over 1000
T tanker	under 450	450 500	500 550	550 600	600 650	650 700	700 750
R-refrigerated	under 400	400 450	450 500	500 550	550 600		

Passengers		Propulsion	Propellers
under 12	over 12		
S	S1	Steam	1
M	M1	Motor	1
SE	SE1	Turbo electric	1
ME	ME1	Diesel electric	1
ST	S2	Steam	2
MT	M2	Motor	2
SET	SE2	Turbo electric	2
MET	ME2	Diesel electric	2

Thus, a C3-SE2 is a cargo ship with two propellers and turbo electric drive, less than 500 feet long, carrying more than 12 passengers. a T2-MET is a tanker with two propellers and diesel electric drive, carrying less than 12 passengers.

NAVY READING TASK TEST/INVENTORY — RESULTS OF EXPLORATORY STUDY

Type of Task: Following Directions Using Texts and Tables (Form M, Item 16)

Question: Situation — You are responsible for classifying merchant ships. What classification would you give a ship with the following characteristics:

A 475-ft passenger ship that carries 300 passengers powered by turbo electric drive and has 2 propellers?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

	READING GRADE LEVEL									
	6	7	8	9	10	11	12	13	14	TOTAL
N	6	10	5	9	19	3	6	5	18	81
%	17	30	20	33	21	0	33	0	56	30

Inventory Results: Frequency with which this type of task is performed.

	1 1 to 3 times a year	2 1 time each month	3 2 to 3 times a month	4 1 or more times each week	5 Daily	Not Used
Electronics Technician						
Electrician's Mate						
Gunner's Mate			NOT RATED			
Boatswain's Mate						

Direction This is determined by a compass, either magnetic or gyro, which will be described later. The four cardinal directions are north, east, south, and west. All directions are measured from north on a system of 360 degrees, in which east is 090 degrees, south is 180 degrees, west is 270 degrees, and north is either 360 or 000 degrees.

Time Two kinds of time are used at sea: local apparent time as determined by the passage of the sun across the sky, and Greenwich mean time (GMT), which is mean time (time based on the sun) at the prime meridian in Greenwich, England, from which all meridians of longitude east and west are measured. All standard time is also measured from that meridian. (A World Time Chart, showing the 24 standard time zones around the world, appears in Chapter 10.) GMT is used for observations in celestial navigation and is shown by chronometers—highly accurate clocks. (GMT is also used in communications, as described in Chapter 10.)

Each standard time zone bears a number, as well as a plus (+) or minus (−) sign and a letter. The number refers to the difference in time between that zone and the Greenwich zone. The sign tells whether the time is earlier (+) or later (−) than the Greenwich zone time; the sign shows how to find Greenwich time from the standard time in any zone. If a ship is in zone + 4, and the clock showed the time to be 1300 aboard the ship, it would be 1300 + 4 or 1700 in the Greenwich zone. In radio traffic, when the time of origin of a dispatch is expressed in GMT, it is indicated by ZULU after the date-time group.

NAVY READING TASK TEST/INVENTORY — RESULTS OF EXPLORATORY STUDY

Type of Task: Finding Facts in Texts (Form D, Item 7)

Question: When calculating GMT, how many hours would you add to the standard time if you were in zone +3?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

	READING GRADE LEVEL									
	6	7	8	9	10	11	12	13	14	TOTAL
N	10	8	9	8	11	3	15	5	15	84
%	10	63	67	38	100	100	93	100	100	75

Inventory Results: Frequency with which this type of task is performed.

	1	2	3	4	5	
	1 to 3 times a year	1 time each month	2 to 3 times a month	1 or more times each week	Daily	Not Used
Electronics Technician		X				
Electrician's Mate				X		
Gunner's Mate						X
Boatswain's Mate						X

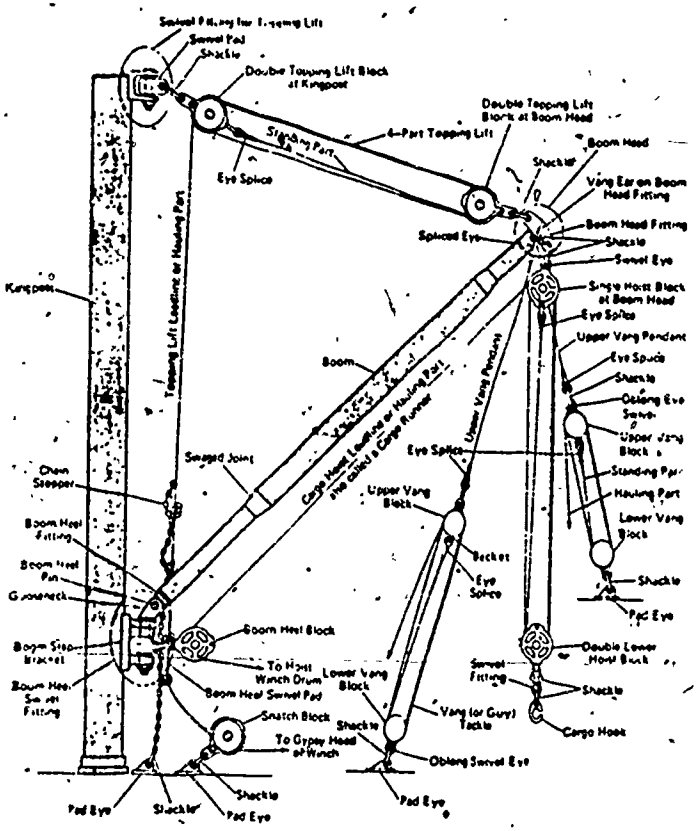


Figure 18-18 Rigging detail for single swinging boom.

B-23

NAVY READING TASK TEST/INVENTORY — RESULTS OF EXPLORATORY STUDY

Type of Task:- Finding Facts in Figures (Form D, Item 8).

Question: In addition to the boom heel swivel fitting, what else is attached to the kingpost?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

	READING GRADE LEVEL									
	6	7	8	9	10	11	12	13	14	TOTAL
N	10	8	9	8	11	3	15	5	15	84
%	60	50	56	63	82	67	73	80	93	71

Inventory Results: Frequency with which this type of task is performed.

	1	2	3	4	5	
	1 to 3 times a year	1 time each month	2 to 3 times a month	1 or more times each week	Daily	Not Used
Electronics Technician			X			
Electrician's Mate				X		
Gunner's Mate						X
Boatswain's Mate				X		

B-24

FOG SIGNALS

Type of Vessel	International		Inland	
	Signal	Maximum Interval	Signal	Maximum Interval
Power vessel under way with way on	—	2 Min.	—	1 Min.
Power vessel under way with no way on	— —	2 Min.	—	1 Min.
Towing				
Power vessel	— • •	1 Min.	— • •	1 Min.
Sailing vessel	— • •	1 Min.		
Vessel laying submarine cable or navigation marks	— • •	1 Min.	— • •	1 Min.
Vessel not under command	— • •	1 Min.	— —	1 Min.
Vessel towed	— • • •	1 Min.	— • • •	1 Min.
Vessel at anchor	• • • • •	1 Min.	• • • • •	1 Min.
Vessel aground	• • • • • #	1 Min.		
Sailing Vessel				
on starboard tack	— •	1 Min.	—	1 Min.
on port tack	— —	1 Min.	— —	1 Min
wind abaft beam	— — —	1 Min.	— — —	1 Min.
Vessels fishing	— • •	1 Min.		

Notes: Sounding of gong aft applies only to vessels over 350 feet in length at anchor or aground in International Waters.

Vessels at anchor in International Waters may sound a three blast signal, 1 short, 1 prolonged, and 1 short to give warning of their position.

Symbols	Meaning
•	a short blast (about one second duration)
–	a blast of unspecified duration
—	a prolonged blast (four to six seconds duration)
———	a long blast (duration at least 8 seconds, usually 8-10)
• • • • •	ringing a bell for five seconds
•	three strokes of a bell
#	gong, five seconds

NAVY READING TASK TEST/INVENTORY — RESULTS OF EXPLORATORY STUDY

Type of Task: Finding Facts in Tables (Form D, Item 9).

Question: "What is the meaning of this symbol, *****, when used in a fog signal table?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

	READING GRADE LEVEL									
	6	7	8	9	10	11	12	13	14	TOTAL
N	10	8	9	8	11	3	15	5	15	84
%	70	88	67	50	72	100	53	60	60	64

Inventory Results: Frequency with which this type of task is performed.

	1 1 to 3 times a year	2 1 time each month	3 2 to 3 times a month	4 1 or more times each week	5 Daily	Not Used
Electronics Technician		X				
Electrician's Mate				X		
Gunner's Mate						X
Boatswain's Mate						X

Right of Way. When two boats or ships approach each other in such a way that there is risk of collision, at least one is required to keep out of the way of the other. The ship which must keep out of the way of the other is called the *burdened vessel*. The other ship is required to maintain course and speed, and is called the *privileged vessel*.

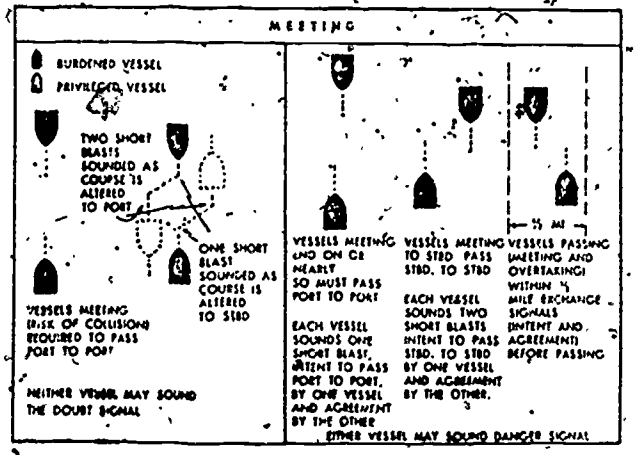
In a *meeting situation*, both vessels are burdened. In *all* waters, power vessels meeting in a genuine end on situation are required to pass port to port. If there is any doubt concerning the side on which meeting vessels should pass, they should pass port to port. One short blast means a port-to-port passing; two short blasts mean starboard-to-starboard passing.

International Rules authorize only a port-to-port passing, but are silent regarding a starboard-to-starboard passing. Accordingly, a starboard-to-starboard passing is proper under the International Rules only when there is no risk of collision. In a port-to-port passing, one short blast is sounded as course is altered to starboard.

In U.S. inland waters, a starboard-to-starboard passing is not only permitted, but is required. If the courses of the vessels are so far to starboard of each other that the vessels are not considered to be meeting end on, or nearly so, they are required to pass starboard-to-starboard.

B-25

Figure 20-4 Meeting Situation



NAVY READING TASK TEST/INVENTORY — RESULTS OF EXPLORATORY STUDY

Type of Task: Finding Facts in Text and Figures (Form D, Item 10)

Question: When two vessels meet end on, how do they pass?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

	READING GRADE LEVEL									
	6	7	8	9	10	11	12	13	14	TOTAL
N	10	8	9	8	11	3	15	5	15	84
%	40	75	78	75	91	100	60	80	93	75

Inventory Results: Frequency with which this type of task is performed.

	1 1 to 3 times a year	2 1 time each month	3 2 to 3 times a month	4 1 or more times each week	5 Daily	Not Used
Electronics Technician		X				
Electrician's Mate				X		
Gunner's Mate						X
Boatswain's Mate						X

Ship's Bell Before timepieces were common, time aboard ship was marked by a so-called hour-glass, which ran out in 30 minutes. Then the glass would be turned over, to start measuring another 30 minutes, and the bell would be struck so all hands knew a half hour had passed. At the end of each half hour, the bell would be struck one more time; thus it was struck once at the end of the first half hour and eight times at the end of the fourth hour. This practice still continues despite clocks and watches. After eight bells are struck, the sequence starts all over again. An odd number of bells marks a half hour, and an even number marks an hour. For the relation between Navy time, bells and watches, see table below.

mid-watch		morning watch		forenoon watch		afternoon watch		evening watch		night watch	
time	bells	time	bells	time	bells	time	bells	time	bells	time	bells
0030	1	0430	1	0830	1	1230	1	1630	1	2030	1
0100	2	0500	2	0900	2	1300	2	1700	2	2100	2
0130	3	0530	3	0930	3	1330	3	1730	3	2130	3
0200	4	0600	4	1000	4	1400	4	1800	4	2200	4
0230	5	0630	5	1030	5	1430	5	1830	5	2230	5
0300	6	0700	6	1100	6	1500	6	1900	6	2300	6
0330	7	0730	7	1130	7	1530	7	1930	7	2330	7
0400	8	0800	8	1200	8	1600	8	2000	8	2400	8

NAVY READING TASK TEST/INVENTORY — RESULTS OF EXPLORATORY STUDY

Type of Task: Finding Facts in Texts and Tables (Form D, Item 11)

Question: In a single 24 hour period, how many times are 8 bells struck?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

	READING GRADE LEVEL									
	6	7	8	9	10	11	12	13	14	TOTAL
N	10	8	9	8	11	3	15	5	15	84
%	30	50	67	75	64	100	80	60	87	69

Inventory Results: Frequency with which this type of task is performed.

	1	2	3	4	5	
	1 to 3 times a year	1 time each month	2 to 3 times a month	1 or more times each week	Daily	Not Used
Electronics Technician	X					
Electrician's Mate				X		
Gunner's Mate			X			
Boatswain's Mate					X	

Splicing

Splicing (figure 16-5) is a method of permanently joining the ends of two lines or of bending a line back on itself so as to form a permanent loop. If properly done, it does not weaken the line. A splice between two lines will run over a sheave or other object much easier than a knot.

Short Splice For a short splice, both ends of line are unlaid for a short distance and the strands are interlaced. One strand is tucked through the lay of the other line, which has been opened by a marlinspike or wooden fid. The other two strands are similarly tucked. Threads are then cut away from the ends of each tucked strand until they are two-thirds their original size, and then they are again tucked. Again the strands are similarly cut away until they are one-third their original size, and a third and last tuck is taken. This produces a neat, tapered splice.

In splicing a 4-strand line, the first strand is tucked under two parts of the first tucking only.

Long Splice For a long splice, the ends are unlaid farther than for a short splice and then are similarly interlaced. Then a strand of one piece is unlaid for quite a distance, and the corresponding strand of the other piece is laid in the opening. The remaining ends of the two strands are twisted together for convenience, the line is turned end for end, and the first operation is repeated with two other corresponding strands.

The remaining strands of each part are left at the original position. This leaves pairs of strands at three positions along the line. Each of the strands is halved, two of these halves at each position are tied together with an overhand knot, and the remaining two halves are tucked over one and under one of the full remaining strands of the line. After all strands have been tucked, the loose ends are trimmed off smooth. This splice will run over a sheave easily and is hardly noticeable. In splicing nylon line, make several extra tucks to be certain the splice holds.

Eye Splice An eye splice is made by the same method, except that the line is first brought back upon itself enough to give the desired size of eye, and the strands are then tucked into the body of the line.

Worming, Parceling, and Serving This is done to protect wire rope that must be exposed to the weather or to exceptionally hard usage.

Worming consists of following the lay of the rope between the strands with tarred small stuff. This keeps moisture from penetrating to the interior of the rope and fills out the rope, giving a smooth surface for the parceling and serving.

NAVY READING TASK TEST/INVENTORY — RESULTS OF EXPLORATORY STUDY

Type of Task: Following Directions Using Text (Form D, Item 12)

Question: Situation: You are making a long splice. You have completed the first operation and have pairs of strands at three positions. After each of these strands are halved,

What is done with the four halves before the loose ends are trimmed?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

	READING GRADE LEVEL									
	6	7	8	9	10	11	12	13	14	TOTAL
N	10	8	9	8	11	3	15	5	15	84
%	40	38	78	50	73	100	87	100	100	74

Inventory Results: Frequency with which this type of task is performed.

	1	2	3	4	5	
	1 to 3 times a year	1 time each month	2 to 3 times a month	1 or more times each week	Daily	Not Used
Electronics Technician		X				
Electrician's Mate					X	
Gunner's Mate						X
Boatswain's Mate				X		

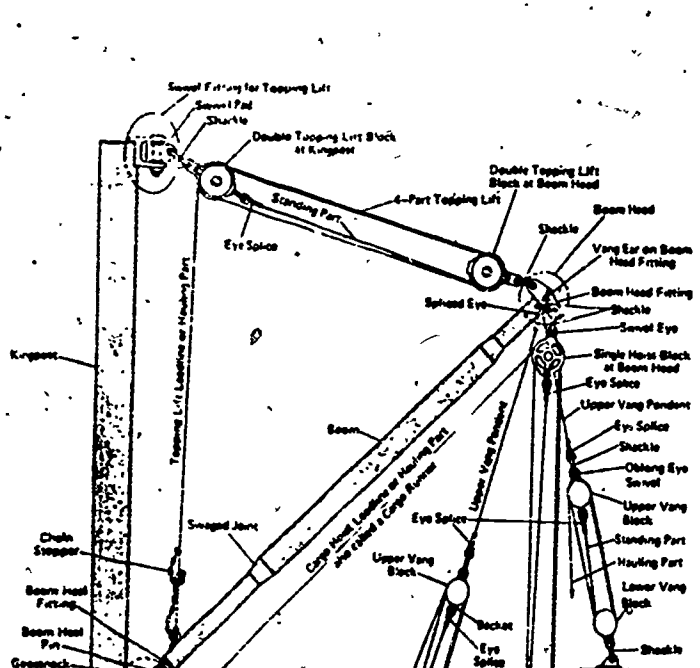


Figure 16-18 Rigging detail for single swinging boom.

NAVY READING TASK TEST/INVENTORY — RESULTS OF EXPLORATORY STUDY

Type of Task: Following Directions Using Figures (Form D, Item 13)

Question: Situation: You are rigging a single swing boom. You have completed all the rigging except to rig the topping lift leadline.

Which three blocks must this line go through before it reaches the gypsy head of the winch?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

	READING GRADE LEVEL									
	6	7	8	9	10	11	12	13	14	TOTAL
N	10	8	9	8	11	3	15	5	15	84
%	20	50	22	50	27	0	20	80	40	33

Inventory Results: Frequency with which this type of task is performed.

	1	2	3	4	5	
	1 to 3 times a year	1 time each month	2 to 3 times a month	1 or more times each week	Daily	Not Used
Electronics Technician		X				
Electrician's Mate				X		
Gunner's Mate						X
Boatswain's Mate				X		

B-29

FOG SIGNALS

Type of Vessel	International		Inland	
	Signal	Maximum Interval	Signal	Maximum Interval
Power vessel under way with way on	—	2 Min	—	1 Min.
Power vessel under way with no way on	— —	2 Min.	—	1 Min.
Towing				
Power vessel	— · ·	1 Min.	— · ·	1 Min.
Sailing vessel	— · ·	1 Min.		
Vessel laying submarine cable or navigation marks	— · ·	1 Min.	—	1 Min.
Vessel not under command	— · ·	1 Min.	—	1 Min.
Vessel towed	— · · ·	1 Min.	— · · ·	1 Min.
Vessel at anchor	••••• #	1 Min.	•••••	1 Min.
Vessel aground	••••••• #	1 Min.		
Sailing Vessel				
on starboard tack	— ·	1 Min.	—	1 Min.
on port tack	— —	1 Min.	— —	1 Min.
wind abaft beam	— — —	1 Min.	— — —	1 Min.
Vessels fishing	— · ·	1 Min.		

NOTES: Sounding of gong aft applies only to vessels over 350 feet in length at anchor or aground in International Waters.

Vessels at anchor in International Waters may sound a three blast signal, 1 short, 1 prolonged, and 1 short to give warning of their position.

Symbols	Meaning
·	a short blast (about one second duration)
–	a blast of unspecified duration
—	a prolonged blast (four to six seconds duration)
———	a long blast (duration at least 8 seconds, usually 8-10)
•••••	ringing a bell for five seconds
°	three strokes of a bell
#	gong, five seconds

NAVY READING TASK TEST/INVENTORY – RESULTS OF EXPLORATORY STUDY

Type of Task: Following Directions Using Tables (Form D, Item 14)

Question: Situation: You are in charge of sounding fog signals. Your ship is towing another power vessel when you encounter heavy fog. What signal will you sound and how often will you sound it?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

	READING GRADE LEVEL									
	6	7	8	9	10	11	12	13	14	TOTAL
N	10	8	9	8	11	3	15	5	15	84
%	10	38	22	38	46	0	80	80	67	48

Inventory Results: Frequency with which this type of task is performed.

	1	2	3	4	5	
	1 to 3 times a year	1 time each month	2 to 3 times a month	1 or more times each week	Daily	Not Used
Electronics Technician	X					
Electrician's Mate				X		
Gunner's Mate						X
Boatswain's Mate						X

STEERING AND SAILING RULES FOR SHIPS

There are three basic situations when two ships are in sight of each other in which risk of collision may exist: *meeting, overtaking,* and *crossing* (figure 20-4). The situation depends upon the relative position of the two ships when they first sight each other.

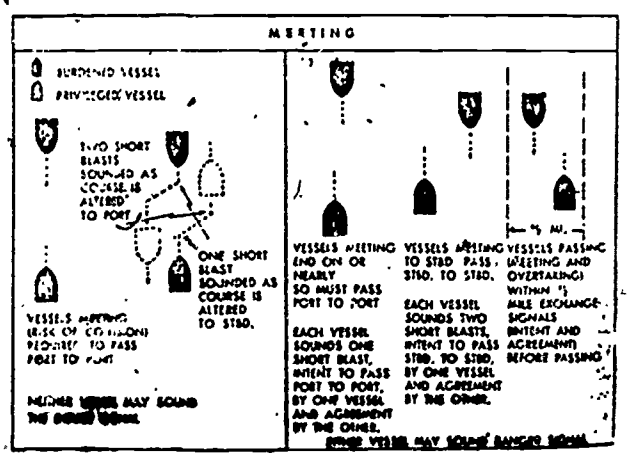
Right of Way When two boats or ships approach each other in such a way that there is risk of collision, at least one is required to keep out of the way of the other. The ship which must keep out of the way of the other is called the *burdened vessel.* The other ship is required to maintain course and speed, and is called the *privileged vessel.*

In a *meeting situation,* both vessels are burdened. In *all* waters, power vessels meeting in a genuine end on situation are required to pass port to port. If there is any doubt concerning the side on which meeting vessels should pass, they should pass port to port. One short blast means a port-to-port passing; two short blasts mean starboard-to-starboard passing.

International Rules authorize only a port-to-port passing, but are silent regarding a starboard-to-starboard passing. Accordingly, a starboard-to-starboard passing is proper under the International Rules only when there is no risk of collision. In a port-to-port passing, one short blast is sounded as course is altered to starboard.

In U.S. inland waters, a starboard-to-starboard passing is not only permitted, but is required. If the courses of the vessels are so far to starboard of each other that the vessels are not considered to be meeting end on, or nearly so, they are required to pass starboard-to-starboard.

Figure 20-4 Meeting Situation



NAVY READING TASK TEST/INVENTORY — RESULTS OF EXPLORATORY STUDY

Type of Task: Following Directions Using Texts and Figures (Form 0, Item 15)

Question: Situation: Your ship meets another ship to starboard and wishes to pass.

In which direction is the passing made and what message is sounded?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

	READING GRADE LEVEL									
	6	7	8	9	10	11	12	13	14	TOTAL
N	10	8	9	8	11	3	15	5	15	84
%	30	38	56	63	55	33	67	40	67	54

Inventory Results: Frequency with which this type of task is performed.

	1	2	3	4	5	
	1 to 3 times a year	1 time each month	2 to 3 times a month	1 or more times each week	Daily	Not Used
Electronics Technician		X				
Electrician's Mate				X		
Gunner's Mate						X
Boatswain's Mate						X

Ship's Bell Before timepieces were common, time aboard ship was marked by a so-called hour-glass, which ran out in 30 minutes. Then the glass would be turned over, to start measuring another 30 minutes, and the bell would be struck so all hands knew a half hour had passed. At the end of each half hour, the bell would be struck one more time; thus it was struck once at the end of the first half hour and eight times at the end of the fourth hour. This practice still continues despite clocks and watches. After eight bells are struck, the sequence starts all over again. An odd number of bells marks a half hour, and an even number marks an hour. For the relation between Navy time, bells and watches, see table below.

mid-watch		morning watch		forenoon watch		afternoon watch		evening watch		night watch	
time	bells	time	bells	time	bells	time	bells	time	bells	time	bells
0030	1	0430	1	0830	1	1230	1	1630	1	2030	1
0100	2	0500	2	0900	2	1300	2	1700	2	2100	2
0130	3	0530	3	0930	3	1330	3	1730	3	2130	3
0200	4	0600	4	1000	4	1400	4	1800	4	2200	4
0230	5	0630	5	1030	5	1430	5	1830	5	2230	5
0300	6	0700	6	1100	6	1500	6	1900	6	2300	6
0330	7	0730	7	1130	7	1530	7	1930	7	2330	7
0400	8	0800	8	1200	8	1600	8	2000	8	2400	8

NAVY READING TASK TEST/INVENTORY — RESULTS OF EXPLORATORY STUDY

Type of Task: Following Directions Using Texts and Tables (Form D, Item 16)

Question: Situation: You are on evening watch. You are told to report to your chief at 4 bells and at 8 bells.

At what times will you report?

Test Results: Percentage of personnel at each reading grade level who got the correct answer.

	READING GRADE LEVEL									
	6	7	8	9	10	11	12	13	14	TOTAL
N	10	8	9	8	11	8	15	5	15	84
%	70	63	78	50	100	100	87	80	87	80

Inventory Results: Frequency with which this type of task is performed.

	1	2	3	4	5	
	1 to 3 times a year	1 time each month	2 to 3 times a month	1 or more times each week	Daily	Not Used
Electronics Technician	X					
Electrician's Mate				X		
Gunner's Mate			X			
Boatswain's Mate					X	

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