

PROCEEDINGS

OF THE MARINE SAFETY COUNCIL

DEPARTMENT OF TRANSPORTATION COAST GUARD

TEST

CHIEF ENGINEER
STEAM AND MOTOR

General Subjects
Part 1

2013

EXAMINATION - SECRETARY MARINE

EXAMINATION SHEET

SOCIAL SECURITY NUMBER

EXAMINATION IDENTIFICATION NO.

NAME

SCORE

STATUS

TEST

WRONG

RIGHT

PRIVACY ACT OF 1974

NEITHER MANDATORY OR VOLUNTARY - 46 U.S.C. Sec 314, 324, 326, 328, 332, 46 CFR 16.02-600

81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

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PROCEEDINGS

OF THE MARINE SAFETY COUNCIL

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COVER

Many merchant marine officers became familiar with test booklets and answer sheets similar to these the last time they sat for issuance or renewal of their licenses. And many more in various categories of service will be getting to know them in the future.

Over the past 4 years, the long-familiar essay type tests have begun to be phased out in favor of standardized, machine-graded, multiple choice examinations. This change is the latest development in a long (126-year) history of the nation's merchant marine licensing program.

How licensing procedures came to the point where they are today, and where they are going in the future, is the subject of one of this month's features. The author is a Coast Guard officer who has been involved in the development of these new examinations for more than 6 years. The article is adapted from a presentation made at the National Safety Congress and Exposition which was held 17-20 October 1977.

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maritime sidelights

1978 MERCHANT MARINE SEAMANSHIP TROPHY

Nominations are now being sought for the award of the 1978 Merchant Marine Seamanship trophy.

Established in 1962, the award gives recognition to U.S. citizens for deeds exemplifying the highest traditions of seamanship and maritime skills. The award is a sterling silver cup inscribed at the base with names and deeds of the recipients. The winner is chosen by a Select Committee appointed by the Assistant Secretary of Commerce for Maritime Affairs. The committee is made up of steamship labor and management and government officials, including the Commandant of the Coast Guard. The Select Committee reviews nominations annually and, when merited, chooses the winner.

In the past, such feats as the coordinated action of officers and crew in fighting a disastrous shipboard fire, a bosun's heroic actions to save his sinking ship, and the rescue of seven men from a sinking schooner during a North Atlantic storm have merited the award.

In 1977, the trophy was presented to Captain Richard A. Fryer. Fryer was the master of the USNS Sealift China Sea, a Marine Transport Lines tanker operated for the Military Sealift Command. Captain Fryer was selected for conducting the rescue of 31 crewmembers of the MV Victory Glee which sank on 7 June 1976.

Nominations based on the following criteria will be considered:

1. The candidate must be a U.S. citizen. Only individuals are eligible - corporations, partnerships, and associations are excluded.

2. The candidate must have performed a feat of distinguished

seamanship while aboard a civilian manned U.S.-flag vessel during the calendar year 1977.

- a. "Distinguished seamanship" has been defined by the Select Committee to include either a distinguished feat of professional competence in the presence of extreme peril to life or property, or an outstanding feat of seamanship exemplifying the highest standards of professional competence under severe, adverse weather conditions.

- b. "U.S.-flag vessel" may include yachts or other small craft.

3. Nominations are accepted on a continuing basis, but all nominations for the 1978 award must be received by the Secretariat, c/o Eastern region Director, Maritime Administration, 26 Federal Plaza, New York, N.Y. 10007 by March 1, 1978.

INTERNATIONAL ICE PATROL

In February or March of 1978, depending upon conditions, the International Ice Patrol will commence its annual service of guarding the southeastern, southern, and southwestern limits of the Grand Banks of Newfoundland for the purpose of informing passing ships of the extent of icebergs in this region.

Reports of ice in this area are collected from passing ships and from aerial reconnaissance by Ice Patrol aircraft. Information on ice conditions is provided by the Ice Patrol at 0000 GMT and 1200 GMT daily by an Ice Patrol Bulletin sent out by radio and landline circuits, as well as a radiofacsimile chart which is transmitted at 1600 GMT daily.

The 1978 ice season marks the 66th year since the inception of the International Ice Patrol. The 1977 season was extremely light with 22 icebergs drifting south of 48°N, well under the 1946-1977 yearly average of 309 icebergs.

Unfortunately, because of the extreme complexity of the factors involved, present technology does not allow for reliable season severity predictions using readily available data. However, technology does promise tremendous advancements that could improve present methods of detec-

tion and tracking icebergs. In the spring of this year, a new satellite named SEASAT-A will be launched. This satellite will not only provide more frequent and detailed environmental data, but may also have the ability to detect and identify icebergs through all weather conditions. This will be accomplished with a variety of onboard remote sensors.

Should this technique prove feasible, the Ice Patrol will greatly advance its iceberg surveillance capability, and at the same time reduce overall costs.

SANSENINA REPORT

The Marine Board of Investigation looking into the December 1976 explosion of the Liberian tanker Sansenina in Los Angeles Harbor has completed its report.

The casualty resulted in six members of the crew known dead, and 22 injured. Two other crewmembers and a terminal security guard are missing and presumed dead. An additional 36 persons ashore were injured.

The Board concluded that the cause of the casualty was the ignition of a hydrocarbon vapor cloud over the after-deck of the vessel. The cloud was created by the ballasting of tanks under a light-wind condition, which was not adequate for natural dispersion of the vapor. The source of ignition, though it could not be positively identified, was most likely located in the vicinity of the midship deckhouse.

Copies of the complete report are available from the following address:

Commandant (G-MMI-1)
U.S. Coast Guard
Washington, DC 20590

LIGHTS FOR UNMANNED BARGES

Unmanned barges not equipped with machinery for the generation of electricity cannot presently meet the technical lighting requirements of the 72 COLREGS. This is due to the fact that there are

(Continued on page 9)

Licensing Examination Modernization

By LCDR William G. Wohlfarth

U.S. Coast Guard Institute

In the long maritime history of the United States, there have been many technological innovations and advances, particularly those involved with the transition from sail to steam propulsion.

As those innovations and advances occurred, they were accompanied by associated problems which threatened the safety of lives and property carried in steamships. The most serious of those early problems usually involved boiler explosions and fires.

Prior to 1838, for example, accidents involving steamships accounted for approximately 88 percent of all steam plant accidents resulting in substantial loss of life or property damage. Later examples are the boiler explosion and fire aboard SS Sultana which killed 1,700 persons in 1865, the fire aboard SS Morro Castle which killed 124 persons in 1934, and, more recently, the loss of the small passenger vessels Jack and Pelican in 1951 with the loss of 11 persons and 45 persons respectively.

All of the disasters cited received national attention and resulted in efforts toward legislative or regulatory remedies. Following initial federal legislation in 1852, various federal agencies were established from

time to time for the purpose of ensuring the safety of lives and property aboard ships. Since 1942 the Coast Guard has been the agency responsible for that effort.

All of the disasters cited were followed by investigations to determine their cause and to recommend methods of prevention. Of significance in all of these investigations is the finding that human error could be blamed for either causing or contributing to the disasters.

As a result of these findings, license examinations came into use in an effort to determine the competency and qualifications of persons licensed to serve in responsible positions aboard United States merchant ships. The earliest attempt at ensuring safety through license examinations came in 1852, when the Collector of Customs directed locally appointed inspectors to establish a licensing examination program for engineers and pilots. In 1871, license requirements for masters and chief engineers were established, and the licensing agency was given authority to revoke the licenses that it issued.

Through the years the license examinations evolved into an essay format, and by 1942 that for-

mat had become firmly established. The administration of examinations was decentralized in 45 or 50 examining centers located at ports throughout the country. Examinations were locally prepared, administered, and scored, which meant great variation in testing standards.

Some attempts finally were made to establish and maintain standardized license examination procedures throughout the country. Official correspondence in Coast Guard files indicates that those attempts met with little success. This same correspondence shows, as early as 1937, a growing dissatisfaction with both the examinations themselves and the procedures for administering them. This dissatisfaction grew from the increasing obsolescence of the examination questions, the evident compromise of those examinations, and the tolerance of archaic methods of administration. Also in 1937, Congress spoke to the necessity for centralizing and standardizing the preparation and administration of license examinations.

In 1938 and 1941, further attempts were made to modernize the examination questions and to centralize control of examination standards in Washington, D.C.

Neither of those attempts was particularly successful, due in part to the reluctance of the licensing agency to change the status quo.

This was the situation in 1942 when the responsibility for marine inspection and licensing was temporarily transferred, along with with the Bureau of Marine Inspection and Navigation, into the Coast Guard. Little change in that status occurred during the years of World War II, except for the addition of examination subjects and the establishment of stringent examination requirements.

In 1946 this responsibility was made permanent and the Bureau of Marine Inspection and Navigation was abolished.

In 1945 the Coast Guard made its first attempt to standardize the license examinations by culling obsolete questions from the immense accumulation then existing. The remaining essay questions were then assembled into a standard set on file cards; duplicate sets of cards were provided to each marine inspection office involved in licensing. This was the first time that all licensing offices had exactly the same examination to administer.

This attempt at standardization was intended to provide total equality of examinations, allow continual modernization, and assure that all licenses were issued based upon a definite standard of basic qualifications - a standard that would tend to protect lives and property aboard ships.

In 1953 a study was conducted by the Merchant Vessel Personnel Division of Coast Guard Headquarters. This study was directed at further standardization of examination procedures and equality of conditions which an applicant must meet to qualify for a license. The results of that study showed that there was need of greater central control over examination content and procedures to ensure all applicants for a particular grade of license were tested identically.

In addition to the problems of obsolescence and lack of centralized control, there was the problem of examination compromise.

This compromise occurred with the compilation of "ponies" which accurately reproduced license examination questions. Allegedly, some were exact duplicates of the card files maintained by the examiners.

A part of the compromise problem was the tendency of some schools to teach from such ponies, and the inclination of some license applicants to learn solely from ponies by rote memorization.

The Coast Guard was partly responsible for the existence of such ponies through its failure to conduct timely revisions to eliminate obsolete, ambiguous, and incorrect questions. Some license applicants felt compelled to study such ponies in order to learn "the answers required by the Coast Guard," thus enhancing their chances of passing the examination.

An indirect result of the 1953 study was the introduction of multiple choice objective questions into some fields of license examinations. This was the first move away from the traditionally subjective essay questions in continuous use since 1852.

By 1960, conversion from essay questions to multiple choice was underway as an authorized project involving seven different fields of examination subjects. Those subjects were: ocean winds and weather, fire and organization, rules of the road, instruments and accessories, refrigeration, chart navigation, and electricity. That project was never fully implemented, and the questions that had been converted were also soon compromised. This condition remained essentially unchanged until 1969, when a new attempt at updating and standardizing was begun.

In 1969, the Coast Guard contracted with Educational Testing Services, of Princeton, N.J., to conduct a research project designed to review all aspects of merchant marine licensing.

During that study, members of the Educational Testing Services staff visited Coast Guard Marine Inspection Offices in New York, Miami, New Orleans, Cleveland, and San Francisco. Coast Guard officers involved in the license exam-

ination process were questioned to determine how that process functioned. The questioning was also directed toward finding problems in the license examination program and to solicit suggestions for improvement.

The ETS staff also visited the Merchant Vessel Personnel Division of Coast Guard Headquarters where similar discussions were held with officers involved in preparing examination questions and in supervising licensing operations.

Discussions were held with personnel from the U.S. Merchant Marine Academy at Kings Point, N.Y., and with representatives from the New York State Maritime College at Fort Schuyler, N.Y., to seek their views on the licensing process. Additional views and suggestions were obtained in discussion with representatives of several labor organizations involved in the training of merchant marine officers. These were the International Organization of Masters, Mates and Pilots, and Districts I and II of the Marine Engineers Beneficial Association. The principal ETS investigator for this study also attended a 1-day conference with the heads of five state maritime colleges and academies, and another conference sponsored by the Maritime Administration of the Department of Commerce. Those conferences discussed all aspects of the Coast Guard licensing process.

The recommendations made as a result of that study fell into two categories, those designed to produce an interim program for immediate use, and those designed to produce a long-range program whose goal would be an "ultimate" examination and procedure.

It was recommended that the Coast Guard:

1. appoint a broadly based advisory committee that would make recommendations as to necessary changes in the license procedure and structure for merchant marine personnel. This committee would also assist in developing procedures and policies to enable the Coast Guard to carry out its licensing responsibilities effectively and efficiently.

2. appoint a committee consisting of representatives from marine industry management, labor, and educational institutions. The committee would assist in developing specifications reflecting the minimum requirements for safe operation of ships in today's merchant marine. These specifications would be the basis for developing new license examinations.

3. centralize in Coast Guard Headquarters all responsibility to develop quality examinations, establish standard procedures for administering examinations, and conduct research necessary for examination improvement.

4. augment Headquarters staff with sufficient professional and clerical staff to install and operate an effective and efficient examination system.

5. convert all examinations to an objective question format.

6. change the procedures governing examinations so as to set enforceable and realistic time limits for each examination section. Provide license applicants with reference materials and formulas during the tests unless memorization of test material is desirable. Permit any applicant to complete the entire examination regardless of failure in one or more test sections. Establish necessary guidelines to allow applicants to be retested within a definite time period. Complete failures should be administered a complete examination while partial failures would be retested only in the sections failed.

7. establish standard conditions for test administration and scoring. Discontinue the practice of allowing and encouraging discussion between the examiner and applicant concerning test questions. Require evaluation of each applicant to be based solely on written records.

8. establish effective procedures for statistical analysis of all examination questions to determine their difficulty and discriminating power. Analyze the comparability of various test forms and the reliability of the scoring system used. Initiate effective procedures for contin-

uous review of examination specifications, questions, and scoring guides to ensure they are accurate and applicable to the job.

9. initiate studies for effecting long-range improvements in the license examination system. The improvements should include simulators for applicant testing, advanced technology such as computers and optical scanning devices for scoring examinations, and automated high-speed typewriters for assembling examinations from a data bank.

These are not all of the recommendations made, but they are illustrative of the scope of the study done by ETS and of the problems brought to view.

As a result of this study, the Coast Guard decided on the following immediate course of action:

1. Develop modern job specifications for Master, Chief Mate, Second Mate, and Third Mate deck officer licenses and for Chief Engineer, First Assistant Engineer, Second Assistant and Third Assistant Engineer officer licenses. These specifications were to be the foundation of a new and professionally valid examination program.

2. Eliminate essay questions from the license examinations and replace them with objective multiple choice questions. The major reasons for this action were:

(a) The majority of marine industry personnel contacted expressed preference for such a change.

(b) The ETS study determined there was great variation in the expertise and experience of license examiners, due in part to duty assignment rotation. As a result of this variation, unequal examination standards were being applied.

(c) A multiple choice examination can be administered in less time than required for an essay examination.

(d) Multiple choice examination can be processed, analyzed, and scored in a central location. This eliminates any subjectivity in scoring, applies standardized scoring criteria to all applicants, and allows all applicants to benefit from item analysis

applied to each examination.

(e) The new multiple choice examinations would be developed with assistance from all segments of the marine industry, including management, labor, and educators. This would result in an examination having maximum validity and job applicability.

To implement this course of action, the Coast Guard contracted with Educational Testing Services for the development of job specifications applicable to deck and engineer licenses and for development of multiple choice examinations to replace the essay examinations.

Development of job specifications was accomplished by using consultants from every segment of the marine industry. The consultants wrote job specifications individually, then met in discussion groups over a period of many months. The discussion groups served to resolve differences and conflict in the written specifications.

This diverse group, as might be expected, experienced great difficulty in arriving at a consensus of opinion on each specification written. Such a consensus was eventually developed and substantial acceptance of the specifications achieved. This has been substantiated by the fact that few complaints have been received concerning the subject matter in the examinations developed from those specifications.

The development of multiple choice examination questions followed Coast Guard acceptance and approval of the written specifications. These first objective examinations, for Second and Third Mate and Second and Third Assistant Engineer, were developed by ETS following a method very similar to that used to develop the job specifications. The consultant item writers used came from the same industry sources and were all licensed officers holding Master, Chief Mate, Chief Engineer, and First Assistant Engineer licenses.

The consultants wrote test items individually using the written specifications as a guide to subject matter. The completed

items were then forwarded to ETS in Princeton, where the items were reviewed by panels of marine industry personnel. These review panels critiqued each item for relevancy, accuracy, clarity, and conciseness. As a result of review, many questions were deleted as lacking one or more of these desired qualities. Specialists at ETS then made their final refinements and organized the questions into examinations.

Experimental pretests were conducted in 1972 at various maritime academies, union schools, and marine inspection offices. Analysis of these pretests resulted in additional questions being deleted. The remaining acceptable questions were then arranged in test forms deemed suitable for printing.

Early in 1973, these test forms were sent to the newly formed Merchant Vessel Personnel Research, Development, and Testing Division of the Coast Guard Institute in Oklahoma City. There some final refinements to the examination structure as well as some minor revisions to the questions were made prior to the examinations' first printing in the summer and fall of 1973.

The first administration of the new multiple choice objective examinations occurred in December 1973 at Texas Maritime Academy. These examinations, or their revised editions, have been administered on certain specified days each month since then.

In the first months the new examinations were administered, it became apparent that the pass/fail rate was less than acceptable to both industry and the Coast Guard. This rate ranged from a high of approximately 68 percent passing for Third Mate applicants, to a low of approximately 19 percent for Second Assistant Steam and Motor applicants. The overall passing rate for all license applicants was approximately 50 percent.

Immediate action was taken to discover the causes of this less-than-acceptable rate. A strenuous series of examination review conferences throughout the country were conducted by officers

Where Those Tests Come From

The Merchant Vessel Personnel Research, Development, and Testing Division of the Coast Guard Institute was established in the summer of 1972 specifically to introduce the new multiple choice license examinations. The new division was also given the responsibility for scoring the completed examinations, analyzing the results, making revisions, and developing new examinations on a continual basis.

All of the officers assigned to one of the organization's two branches, deck and engineering, have a background in the marine industry. The majority are maritime academy graduates, and all but one hold licenses as either Master, Mate, or Engineer. The one officer without a license has sailed in the merchant marine in an unlicensed capacity, has spent 30 years in marine engineering, and has better than 7 years

experience in technical writing and examination preparation.

The civilian staff includes a personnel research psychologist with an educational and experience background in test construction, analysis, and validation, and a technical writer with an educational and experience background in writing concisely and explicitly. The clerical and logistics support is provided by two civilian and two enlisted members.

The branch chiefs of the division and their assigned officers are responsible for writing questions to be used in examination development, and are all involved in analysis to assure valid examination content.

One of the officers currently assigned was involved in the initial revisions, and all have participated in all subsequent revisions of the examinations now in use.

of the Guard Institute. Participants in the conferences included the staffs of every maritime academy and union training school and those of most privately operated upgrade schools. The majority of the participants arrived with the preconception that a large proportion of the examination questions were invalid. That preconception was erased from the minds of most during the course of the conferences.

This is not to say that problems were nonexistent in the examinations, for they did exist in some specific areas. Those areas were:

- questions that were vaguely worded;
- questions that were ambiguous;
- unfamiliar question format;
- questions concerning design or theory which were considered inappropriate for lower level license examinations;
- poor quality illustrations accompanying some questions;
- regulations questions distributed at random throughout

the examinations, preventing concentrated reference to those publications;

- insufficient time to complete navigation problems;
- a lack of feedback to failing applicants concerning areas requiring additional study.

All of these problems were resolved either during the conferences or immediately following. Other problems also existed external to the examinations and had an equally adverse impact. Those problems were:

- applicant and instructor unfamiliarity with the new examinations and procedures;
- doubt in the various training institutions as to what subject matter should be covered in preparing students for the examinations;
- old habits used in studying for the essay examinations had become unbreakable to some applicants;
- anomalies in the early pass/fail rate statistics as a result of some applicants taking the examination simply to have a look at it;

- dilution of the professional mariner courses of instruction at some schools as a result of expanding curricula to include non-professional courses.

All but the latter problem were essentially overcome with the passage of time, and the initial adverse reaction as a result of the unfavorable pass/fail statistics has passed.

The overall results for 1976 and 1977 show a pass rate of approximately 74 percent for Third and Second Mate and Third and Second Assistant Engineer applicants.

The knowledge gained through this experience has since been applied to the development of a standardized set of examinations for unlicensed ratings in the merchant marine, as well as the current examinations for Master, Chief Mate, and Chief and First Assistant Engineer.

The methods employed in developing these examinations closely paralleled those used during the review and revision of the ETS-developed examinations. The same type of review conferences were conducted throughout the country. The same industry personnel were participants in those conferences, with the addition of actively-sailing licensed Masters, Mates, and Engineers, and senior Port Captains and Port Engineers of some of the major shipping companies.

Those conferences were conducted between June 1975 and September 1976. During that time each new examination for the upper level licenses was reviewed by a representative group in at least three different ports. The consensus of opinion developed during the conferences determined if a particular question required revision, should be deleted, or was acceptable as written. As a result, the examinations do not contain questions on obsolete equipment or methods. In fact, they contain as many questions on modern equipment and methods as were acceptable to the majority of those who reviewed them.

This exhaustive review produced what are considered to be valid and job-oriented examinations for determining the basic qualifications of licensed officers in the

United States merchant marine.

The new upper level examinations were first administered in September 1976 and have been administered on certain specified days each month since then.

The overall pass rate for the engineer applicants was approximately 54 percent during the period of September through December 1976. The average passing score for a Chief Engineer applicant was 82 percent correct answers, and an average failing score was 54 percent. The passing score for a First Assistant Engineer applicant was 81 percent correct answers, and the average failing score was 53 percent.

Among the deck officer applicants, the average passing/failing scores were: Master - 83 percent/63 percent; Chief Mate - 83 percent/61 percent. The overall pass rate for the deck officer applicants was approximately 39 percent.

These results were not surprising and, in fact, were anticipated after our experience with the lower level examinations.

Standard item analysis was applied to the examination questions, and most of them were found to be statistically valid. Those few that were not were identified and credit given to all applicants. This is a standard technique that has been in use since the lower level examinations were introduced in 1973.

During the first 6 months of 1977, these statistics improved to approximately 60 percent overall pass rate for the upper level engineer applicants. The average passing/failing scores for Chief Engineer had changed slightly to 83 percent/60 percent. The average scores for First Assistant had also changed to 77 percent/58 percent. The overall pass rate for deck applicants had doubled to approximately 68 percent, and their average passing/failing scores had also improved to 87 percent/63 percent for Master and to 85 percent/67 percent for Chief Mate.

These statistics are expected to improve further in 1978, when the anomaly caused by the option to take the essay examination no longer exists.

There has been relatively lit-

tle adverse reaction to these new multiple choice examinations. This is due primarily to the exhaustive review conducted prior to the examinations being used, and secondarily to the uninhibited dialogue between instructors of the various training schools and officers of the Coast Guard Institute.

What little adverse reaction there has been is usually directed at individual questions. This reaction is usually a complaint that some distractors are almost correct answers or that certain questions require that applicants to exercise too much judgement. Frequently the complaint is that applicants are being questioned in areas they have not had to deal with in examinations before. This latter complaint is invariably directed toward questions on new methods or equipment.

These complaints come from individual applicants or training school instructors. Written complaints are replied to by letter if possible. Telephone complaints from instructors are usually resolved during the initial conversation; individual applicants who telephone are requested to forward any complaints in writing. There have been no complaints received from management in the maritime industry to date.

These new examinations for all grades of unlimited licenses are in place and functioning as intended to determine the basic professional qualifications of merchant marine officers. They are analyzed and reviewed each time they are administered. These analyses give us data which form the basis for validation of the examination. Those data are also one of the bases for any revision that must be done.

The examinations are administered throughout the country following standardized procedures. Each applicant for a particular grade and type of license takes exactly the same examination as every other applicant for that license that month. They are all examined at essentially the same time on the same day, under essentially the same conditions. There is no subjectivity involved in scoring the examinations as

maritime sidelights

(Continued from page 3)

no battery powered lights available which can meet the vertical sector requirements of the regulations.

The present state of technology is such that each light which could meet the requirements would use batteries costing about \$400 and weighing approximately 400 pounds. Three lights are generally required. The batteries would last a month and would not be rechargeable.

Rule 24 (g) of the 72 COLREGS provides that, "Where from any sufficient cause it is impracticable for a vessel or object being towed to exhibit the lights prescribed in paragraph (e) of this rule, all possible measures shall be taken to light the vessel or object towed or at least to indicate the presence of the unlighted vessel or object."

Under this provision, the Commandant has declared as "sufficient cause" the lack of any battery powered lights capable of meeting the vertical sector requirements.

Battery powered lights for unmanned barges not equipped with generators will not be tested for compliance with the vertical sector requirements of the 72 COLREGS. Minimum required intensity must be maintained only in the horizontal plane.

All other requirements of the 72 COLREGS must be met before a light will be approved. Manufacturers should submit the required data to the Commandant (G-MMT-2) for approval.

Unmanned barges not equipped with machinery for the generation of electricity may use battery powered lights approved by the Commandant (G-MMT-2) to comply with rule 24 until 15 July 1981, at which time lights will be required to meet the requirements of Technical Annex I. Interim approval notice will be given to the manufacturers and distributed to District Commanders.

they are all scored at the Coast Guard Institute using automatic scoring machines. The answer sheets from each applicant receive exactly the same treatment and evaluation as all others. If statistical analysis indicates a question is not valid and evaluation supports the statistics, that question is credited to all applicants taking that examination, and the question is rewritten or replaced at the first opportunity.

These methods will continue in use for all existing examinations and for any that are developed in the future.

At present the Coast Guard is developing specifications and examination questions for Master and Mate, and Chief and Assistant Engineer for certain types of uninspected motor vessels and vessels of the offshore mineral and oil industry. The same methods used to develop the existing multiple choice license examinations will be used again.

In the near future, development will begin on examinations for Great Lakes Pilots. We will also develop additional examinations for unlimited Master, Chief Mate, Chief and First Assistant Engineer. There are other categories

of license or operators examinations to be developed which will require approximately 8 more years of work at the Institute's present manning level. The eventual goal is to compile a valid data bank of questions which will allow an essentially new examination to be produced every month.

All future examinations will test on new procedures, methods, and equipment as they come into use in the marine industry. All obsolete questions will be either updated or deleted. Future examinations will also test on the rules and regulations as they apply to new procedures, methods and equipment. As an example of this, the current Master and Mates examinations test on the new International Regulations for Preventing Collisions at Sea which went into effect in July 1977.

As the examinations are developed and evolve, the extent and degree of knowledge required to pass them will become greater. As this occurs, the basic professional qualifications of merchant marine officers must necessarily follow.

This will lead to an ultimate goal of the Coast Guard - improved marine safety.

About the Author

Lieutenant Commander William G. Wohlfarth is presently Chief of the Engineering Branch of the Merchant Vessel Personnel Research, Development, and Testing Division at the Coast Guard Institute. He has held that position since 1 October 1972, and has been involved in the development and implementation of new objective examinations for licensed and unlicensed personnel of the merchant marine.

A former enlisted member and Chief Warrant Officer, Commander Wohlfarth has served in many engineering assignments afloat. He has also served as the Engineer Officer on the staff of Commander, Coast Guard Squadron Three, and simultaneously as Materiel Officer on the staff of Commander, Cruiser-Destroyer Group Seventh



Fleet, Subic Bay. His last duty station, prior to his assignment at the Institute, was at the Marine Inspection Office in San Francisco.

Merchant Marine Personnel Statistics — FY 1977

Merchant Marine Officer Licenses Issued

Engineer

Grade	Original	Renewal
STEAM		
Chief Engineer:		
Unlimited.....	70	1,143
Limited.....	15	104
1st Assistant:		
Unlimited.....	96	409
Limited.....	1	18
2nd Assistant:		
Unlimited.....	300	642
Limited.....	4	10
3rd Assistant:		
Unlimited.....	461	971
Limited.....	4	10
Total.....	951	3,307
MOTOR		
Chief Engineer:		
Unlimited.....	100	277
Limited.....	38	293
1st Assistant:		
Unlimited.....	35	90
Limited.....	16	98
2nd Assistant:		
Unlimited.....	61	115
Limited.....	5	10
3rd Assistant:		
Unlimited.....	414	1,283
Limited.....	5	16
Total.....	674	2,182
Uninspected vessels:		
Chief Engineer.....	212	114
Assistant.....	118	20
Total.....	330	134
Grand total.....	7,578	

Merchant Marine Officer Licenses Issued

Deck

Grade	Original	Renewal
Master:		
Ocean.....	214	1,221
Coastwise.....	15	57
Great Lakes.....	26	117
Bays, sounds, & lakes....	41	149
Rivers.....	34	133
Chief Mate:		
Ocean.....	123	255
Coastwise.....	0	4
Great Lakes.....	0	0
Bays, sounds, & lakes....	1	1
Rivers.....	0	3
2nd Mate:		
Ocean.....	200	284
Coastwise.....	0	4
3rd Mate:		
Ocean.....	288	422
Coastwise.....	8	6
Pilots:		
Great Lakes.....	60	156
Bays, sounds, & lakes....	449	398
Rivers.....	285	438
Master (uninspected vessels)..	318	180
Mate (uninspected vessels)....	107	21
Motorboat Operator.....	3,928	2,579
Radio Officer.....	34	374
Total.....	6,131	6,802
Grand total.....	12,933	

Original Certificates of Registry as Staff Officers Issued

	Atlantic coast	Great Lakes region	Pacific coast	Gulf coast	Total
Chief purser.....	3	0	4	1	8
Purser.....	4	0	5	1	10
Senior Assitant purser.....	0	0	1	0	1
Junior Assitant purser.....	8	1	15	3	27
Surgeon.....	0	0	9	0	9
Professional nurse.....	3	0	2	1	6
Totals.....	18	1	36	6	61

Original Merchant Mariners Documents Issued

	Atlantic Coast	Great Lakes region	Pacific coast	Gulf Coast	Total
October - December.....	1,126	561	621	1,093	3,401
January - March.....	1,074	378	592	1,030	3,074
April - June.....	1,621	645	723	881	3,870
July - September.....	1,370	596	900	1,659	4,525
Totals.....	5,191	2,180	2,836	4,663	14,870

Original and Additional Endorsements Issued

	Atlantic coast	Great Lakes region	Pacific coast	Gulf coast	Total
AB - any waters, unlimited.....	398	36	127	167	728
AB - any waters, 12 months.....	249	69	116	192	626
AB - Great Lakes, 18 months....	9	35	67	1	112
AB - other.....	103	38	101	295	537
Lifeboatman.....	862	16	223	86	1,187
Electrician.....	39	3	85	20	147
Oiler.....	194	46	161	70	471
Fireman-watertender.....	193	44	173	52	462
Other QMED ratings.....	410	35	458	115	1,018
Tankerman.....	344	730	273	607	1,954
Entry & steward.....	4,616	1,487	2,749	4,467	13,319
Totals.....	7,417	2,539	4,533	6,072	20,561

Towboat Operators Licenses Issued

	Candidates	Passed
Operator.....	1,287	659
2nd class operator.....	387	264
Endorsements.....	200	156
Total.....	1,874	1,079

Total licenses including renewals: 21,588

Marine Safety Council Membership

Raymond Harland Wood was born on June 24, 1927, at Concord, N.H. Following graduation from Wilmington High School in Wilmington, Mass., in 1945, he enlisted in the Coast Guard. The following year he accepted an appointment to the Coast Guard Academy, and graduated in June 1950 with a Bachelor of Science Degree in Marine Engineering and a commission as Ensign.

Admiral Wood has had a variety of assignments over his long career, many of them at sea. He has served in the cutters Acushnet, Barataria, Laurel, Cowslip, and Blackhaw. He was in command of the last-named cutter for 2 years ending in 1963.

Admiral Wood has a strong training background, as evidenced by several tours at training facilities. Upon graduation from the Academy, he remained on the training staff as a Tactics Instructor before reporting in the fall to his first cutter. In July of 1957 he began a 4-year tour as an instructor in the Officer Candidate School, then located in New London, Connecticut. In 1959, the school was transferred to its present location at Yorktown, Virginia. Wood, then a lieutenant, served as its first Officer in Charge at that facility. Nearly 10 years later, Commander Wood was again in a training environment - that of a student at the U.S. Naval War College in Newport, Rhode Island. Following graduation from the War College he remained on the staff as Coast Guard advisor for 2 years. While at Newport, Commander Wood took the opportunity to continue his studies, and in 1970 received a Master of Science Degree in International Affairs from George Washington University.

Admiral Wood has also served in a number of operational and staff positions over his career. Early in his career he commanded the Coast Guard Loran Station at French Frigate Shoals, Hawaii. He was attached to the staff of Commander, First Coast Guard District, Boston, for 3 years during



the 1960's, ending that tour as Chief of the Aids to Navigation Branch. During the late 1960's, and before reporting to Naval War College, he served his first tour at Coast Guard Headquarters as Assistant Chief, Personnel Services Division. For his services in that assignment he was awarded the Coast Guard Commendation Medal.

Returning to Coast Guard Headquarters in 1972, Captain Wood was to earn the Meritorious Service Medal in conjunction with his tour of duty as Chief, Congressional Affairs Staff. In his last position as a Captain, he served as Chief of Staff of the Fifth Coast Guard District at Portsmouth, Virginia. It was from that post that Wood was nominated by the President on January 19, 1977, approved by the Senate, and appointed to flag grade to rank as permanent Rear Admiral from July 1, 1977.

Admiral Wood assumed his current post of Chief, Office of Public and International Affairs in June 1977.

Wood is married to Marjorie C. Stearns of Danvers, Mass., and they have two children, Janet and Stephen.

Nautical Queries

The following are examples of questions included in the Master examinations and Second Assistant Engineer examinations.

DECK

1. A first magnitude star is
 - A. 2.5 times as bright as a second magnitude star.
 - B. 3 times as bright as a second magnitude star.
 - C. 5 times as bright as a second magnitude star.
 - D. 10 times as bright as a second magnitude star.
2. Which statement is true of the Uniform Lateral System of buoyage?
 - A. It employs top marks.
 - B. Lighted buoys have the same shape as unlighted buoys.
 - C. The numbering or lettering of fairway buoys is optional.
 - D. All of the above.
3. In the Uniform Lateral System of buoyage, sides of channels may be marked by
 - A. red cylindrical buoys.
 - B. red spar buoys.
 - C. black and white checked conical buoys.
 - D. any of the above.
4. In the Uniform Cardinal System of buoyage, the topmarks may be
 - A. square.
 - B. circular.

- C. T-shaped.
- D. diamond shaped.

5. Which operation must be done when using the Rude Starfinder to identify an unknown body?
 - I. The appropriate blue template and the red template are placed on the star base plate, with the blue template on top.
 - II. The index arrows of the red and blue templates are aligned with the proper value of LHA of Aries on the base plate.
 - A. I only
 - B. II only
 - C. Both I and II
 - D. Neither I nor II

3. When a new cylinder-head stud is turned on a lathe, the minimum effective thread length of the stud is determined primarily by the
 - A. stud length.
 - B. stud diameter.
 - C. head nut diameter.
 - D. stud material.

4. A fire fighter's outfit on cargo vessels must have a
 - A. cannister-type gas mask.
 - B. fresh-air breathing apparatus.
 - C. self-contained breathing apparatus.
 - D. combustible gas indicator.

ENGINEER

1. A bourdon tube steam pressure gauge is equipped with a syphon loop to prevent damage from
 - A. pressure shock.
 - B. uneven expansion.
 - C. entrance of condensate.
 - D. entrance of steam.
2. The primary purpose of oil control rings on a diesel engine piston is to
 - A. provide a reservoir for cylinder lubrication.
 - B. pump oil into the combustion space for cylinder cooling.
 - C. prevent excessive lubrication of compression rings and cylinder.
 - D. allow hydraulic oil film formation on the cylinder.

5. Increasing the temperature of the feedwater entering the steam drum will ultimately result in a (an)
 - A. increase in stack gas temperature.
 - B. increase in fuel consumption.
 - C. decrease in the degree of superheat.
 - D. decrease in the quality of steam entering the superheater.

ANSWERS

- Deck
1. B 2. D 3. D 4. D 5. B
- Engineers
1. D 2. C 3. B 4. C 5. C

Effective Navigation and Vessel Inspection Circulars

7-56	Manned LST's; structural reinforcement and drydocking; hull inspection requirements.
10-60	Placards, forms, and instructions required to be posted aboard vessels; alternate materials and methods.
11-61	Fire hose.
12-61	Inspection procedure for approved inflatable life rafts held in storage.
2-62	Watertight bulkheads in all inspected vessels - maintenance of watertight integrity.
4-62	Renewal of deck officers' licenses - Great Lakes Rules of the Road.
5-62	Renewal of deck officers' licenses - Western Rivers Rules of the Road.
9-62	Liquefied compressed gas cargo hose.
1-63	Notes on inspection and repair of wooden hulls.
2-63	Guide for inspection and repair of lifesaving equipment.
10-63	Typical Class A-60, A-30, A-15 and A-0 steel bulkheads and decks.
11-63	LST's as unmanned barges; structural reinforcement and drydocking; hull inspection requirements.
5-64 CH-1	Renewal of ocean operators' and operators' licenses.
7-64	Renewal of operators' licenses - Great Lakes.
8-64	Renewal of operators' licenses - Western Rivers.
1-65	24.0' x 8.0' x 3.58' steel lifeboats with removable interiors, manufactured by Welin Davit & Boat, replacement of short breast plates.
5-65	Pyrotechnic red flare or star distress signals for pleasure craft and other uninspected vessels.
7-65 CH-1	Renewal of deck officers' licenses
10-65	Stability determination in capsizing cases involving uninspected vessels.
12-65	Alteration or modification of existing cargo or tank vessels, associated safety improvements.
1-66	Requirements for hull structural steel - structural continuity.
3-66	Dual gross tonnages; application of.
1-67	Stability test - preparations and procedures.
3-67	Alterations of ship's structure which may affect the adequacy of installed safety devices.
4-67	Application of incombustible insulation requirements and identification of approved materials.
8-67	Fixed mud ballast; procedures and standards for its use.
3-68	Tensile fasteners.
4-68	Protective equipment required for fireman's outfits.
7-68	Notes on inspection and repair of steel hulls.
8-68	Classification of vessels as self-propelled.
1-69	Automated main and auxiliary machinery.
2-69	Submission of reports for the shipment and discharge of seamen not shipped or discharged before a shipping commissioner; information concerning.
3-69	Z Nomograph method of calculating available GM.
4-69	Inclusion of Social Security numbers on Certificates of Discharge and Discharge for Masters.
5-69	Carriage of flammable and combustible liquids in portable tanks.
6-69	Hazardous cargoes; literature concerning.
7-69 CH-2	Hydraulic releases with primary lifesaving equipment and alternate float-free arrangements.
8-69	Impulse-projected rocket type line-throwing appliances.
11-69	Statement of claims for specially exempted water-ballast spaces in tonnage calculations.
12-69	Special examination in lieu of drydocking for large mobile drilling units.
2-70	Acceptance of pressure vessels used as decompression chambers or for other purposes related to diving.
4-70	Powder loads for Lyle type line throwing guns.
6-70	Fixed free extinguishing systems for use in galley ventilating equipment.
7-70	Marine type portable fire extinguishers.
1-71	Repair of boiler safety valves.
2-71	Pipe stress analysis calculations; procedures for submission of.
4-71	Valves employing resilient material.
5-71	Index to 46 CFR 151 (Certain Bulk Dangerous Cargoes on Unmanned Tank Barges, Subchapter O).
6-71	Monitoring carbon monoxide (CO) in ships' cargo spaces.
2-72	Coast Guard approval of hull structural plans.
3-72	Portable radio apparatus; training in use of.
4-72	Definition of paraffinic hydrocarbon commodities.
6-72 CH-1	Guide to fixed fire-fighting equipment aboard merchant vessels.
1-73	Pilot ladder used aboard merchant vessels.
3-73	Intact stability criteria for passenger and cargo ships under 100 meters in length.
4-73	American Bureau of Shipping approval of machinery and electrical plans.
6-73	Interim regulations for foreign vessels carrying certain bulk dangerous cargoes in U.S. ports.
7-73	Main propulsion boiler automation.
8-73	Alternate means of determining the weight of CO ₂ in fire extinguishing systems.
9-73	Implementation of the Pollution Prevention Regulations (33 CFR, Subchapter D and amendments to 46 CFR, Subchapter D).
2-74	Change in administration of ships' stores and supplies of a dangerous nature.
3-74	Implementation of the regulations concerning licenses for operation of uninspected towing vessels (46 CFR, subpart 10.16 and sections 157.10-83, 157.10-85, 157.30-45).
4-74	Stability information required on inspected and uninspected United States vessels receiving a load line certificate and foreign vessels receiving Form B load line certificates.
6-74	Elimination of unsafe conditions on board tank barges.
7-74	Oil-water separators; acceptance of.
1-75	Fire safety standards for foreign passenger vessels.
2-75	Alteration of existing rafts to comply with improved inflation standards.
3-75	Bulk grain cargoes.
4-75	Bulk liquid cargoes; guide for compatibility of Chemicals.
1-76	Bulk grain cargo calculations.
2-76	Damage stability calculations for tank vessels.
3-76	Stability of fishing vessels.
1-77	Unified interpretations of the 1966 International Convention on Load Lines.
2-77	American Bureau of Shipping acceptance of Structural Fire Protection Approval.
3-77	Code of Safe Practice for Ships Carrying Timber Deck Cargoes.
4-77	Shifting weights or counter-flooding during Emergency Situations.

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