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of the Marine Safety Council

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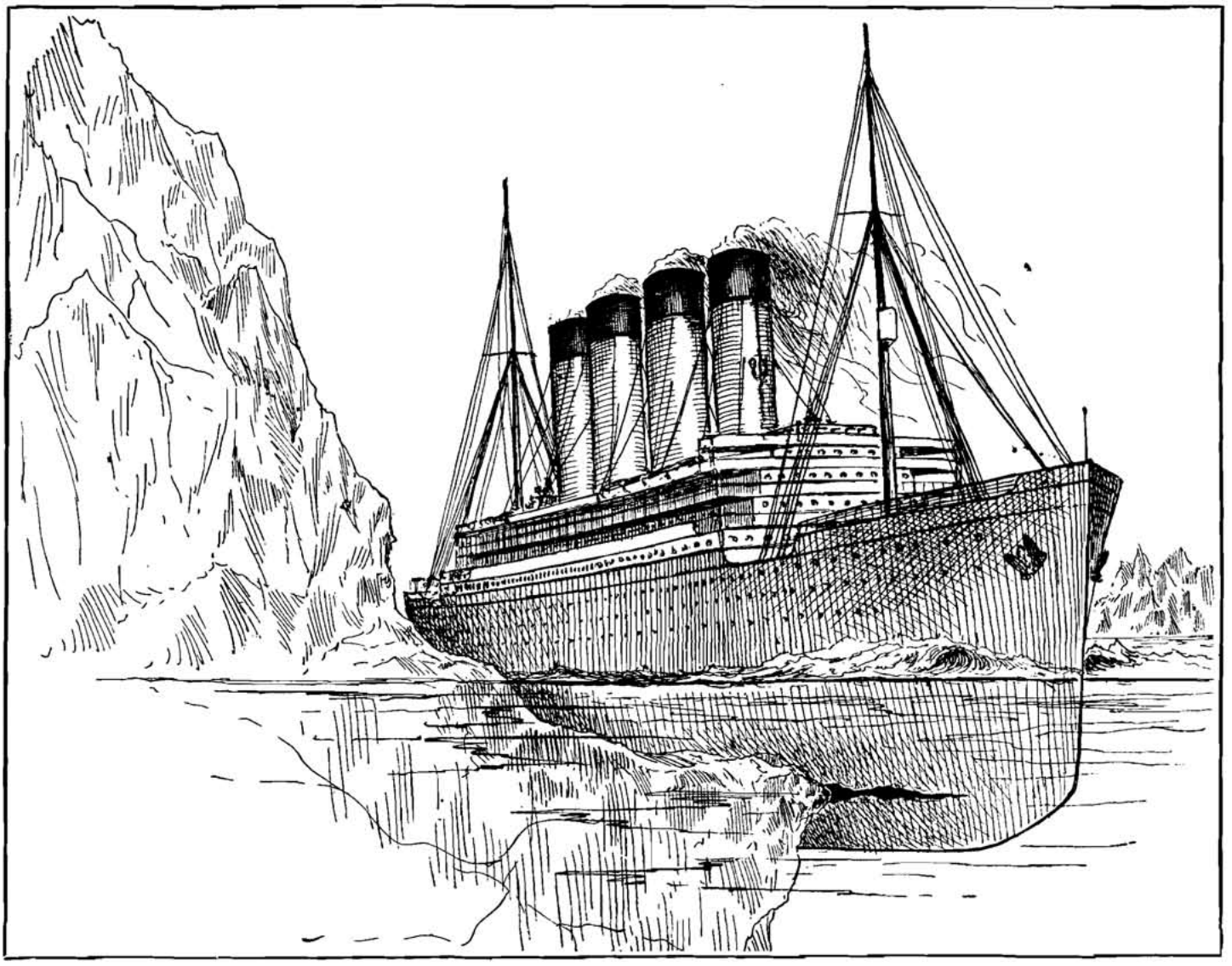

Proceedings
of the Marine Safety Council

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When you have finished reading this issue, please pass it on.

Contents

features

departments

cover

The TITANIC went down on April 15, 1912. Although many people died during this tragic sinking, a surprising number survived, thanks to favorable weather conditions and the successful launching of the lifeboats. The sinking of the TITANIC had far-reaching effects on maritime law and led to, among other things, the establishment of the International Ice Patrol. A sequence of articles on the TITANIC and related subjects begins on page 9.

Maritime Sidelights

A Letter to the Editor

I would like to thank you for printing the article "Close Encounters of a Dangerous Kind" in the Sept/Oct 1981 issue. It is reassuring to see that someone is at least trying to explain to boaters the dangers in approaching large vessels and tows, especially in restricted channels.

As a mate on an ocean-going tugboat, I cannot begin to count the number of times I have seen close calls involving small recreational boaters. The amazing thing is that the number of deaths and injuries has been relatively small. The incidents described in your article point to the need for licensing and instruction for pleasure boaters.

Recently, in Long Island Sound, several people were killed when the operator of a pleasure craft approached too close to a tug with a barge "on the hawser" behind it. However the legal case may turn out, it is obvious that the primary reason for this tragedy was the ignorance and poor judgment of the operator.

Something that your article did not cover was the special hazard in approaching tows "on the hawser." The tugboat operator is severely limited in the actions he can take in a close-quarters situation:

1. He can stop or back the engines, but the barge will keep on coming, possibly running over the tug or tripping (capsizing) it.

2. He can turn one way or the other, but the barge will not turn as quickly. In a sharp turn with a heavy barge, the end result will be the tug going in one direction, the barge in another, with the wire or hawser stretched out in between, mowing down anything in between.

3. He can speed up (if he has any power in reserve) and hope to get ahead of the closing boat. This may decrease the likelihood of a collision but will increase the severity of the damage should the maneuver fail.

In short, his options are limited to early and substantial actions, which may be nullified by the capricious and unpredictable course zigzags of the small boat operator or made impossible by the confines of the channel or nearby shoals. It would seem that the small outboard "rowboat," with a draft of perhaps three or four feet, nevertheless finds it imperative to use the center of the main ship channel, while the tug must scrape past the channel markers to avoid hitting him.

I can only hope that your article, and ones similar to it, will be given wide dissemination to the recreational boating public.

Ron DeMello
Portland, Maine

Conflicts between recreational boats and commercial vessels are a serious problem and should be recognized as such by operators of both types of vessels. How do our other readers feel about this subject? Please share your thoughts or experiences with us.--Ed.

Coast Guardsman Receives New Award for Rescue at Sea

The Association for Rescue at Sea, Inc., recently presented the first of what is to be an annual award, a Gold Medal for Rescue at Sea. The recipient was Coast Guard Boatswains Mate First Class Matthew C. Greer, coxswain of a 44-foot motor lifeboat from Coast Guard Station Beach Haven, New Jersey. Greer pulled two crewmen from a barge that had grounded five miles north of Atlantic City on January 4, 1981. Seas were running to 20 feet with zero visibility. As the men were pulled aboard the lifeboat, one of them shook Greer's hand and said, "Thanks a lot. You gotta be nuts."

The Association was formed in 1976. Its purpose is to promote rescue at sea and to articulate what others are doing in this respect so that they can work in a climate that recognizes the humanitarian aspect of lifesaving at sea. So far, it has collected more than a quarter of a million dollars for the Royal National Lifeboat Institution of Great Britain and given support to the volunteer Bahamas Air-Sea Rescue Association in Nassau. The Association is interested in becoming more involved in domestic lifesaving. To that end, it is seeking new members. Anyone with an interest in safety of life at sea can become a member by making a $25 annual donation. Interested parties should write to:

Association for Rescue at Sea, Inc.
National Westminster Bank Limited
100 Wall Street
New York, NY 10005

National Safety Council Presents General Chairman's Award

Ron Bohn, Hazardous Materials Manager for United States Navigation, Inc. (a subsidiary of Hapag-Lloyd, Inc.), was presented with a General Chairman's Award by the National Safety Council (NSC) at ceremonies held recently in Chicago.

The NSC's Marine Section Best Paper Awards Committee singled out Mr. Bohn for recognition on the basis of his paper "The Why and How of Control Procedures for the Acceptances of Hazardous Materials/Dangerous Goods Offered as Ocean Export Cargoes." The paper was presented at the NSC's 68th National Safety Congress and Exposition in October 1980.

Among the topics Mr. Bohn's award-winning paper dealt with was what elements are important in carrying through control procedures in hazardous cargo shipping. Here Bohn points to the "5 P's": Push, People, Papers, Probing, and Persistence. These five factors, he explains, are necessary for effective and safe handling and shipping of dangerous cargo.

Bohn, who has been with United States Navigation since 1973, has 35 years' experience in the maritime and transportation fields. In addition to his duties at United States Navigation, he teaches a night course, "Ocean Transportation of Hazardous Materials," at the Roosevelt Institute of Maritime Studies in New York City.

Correction

Because of a printer's error, the photographs on page 206 of the November 1981 issue of the Proceedings ("How a Hull Takes Stress") do not correspond to their captions. The photograph at the top of the page should be relabeled **Figure 3**, the middle photograph should be relabeled **Figure 1**, and the bottom photograph should be relabeled **Figure 2**. Many thanks to the readers who wrote to point out the error.

Slide Show on Visual Distress Signals Available

The Coast Guard has produced and distributed a sound/slide show to clarify the new regulation requiring the carriage of visual distress signals on recreational boats. The show explains where and how many types of signaling devices are to be carried, the various types available, when and how to use them, and how to safely handle and store them.

The sound/slide show is available from local Coast Guard Boating Safety Offices or through the Coast Guard Auxiliary. It can also be ordered from the Boating Education Branch at Headquarters by writing to: Commandant (G-BEL-4), U.S. Coast Guard, Washington, DC 20593.

SNAME Announces Scholarships

Scholarships at both the graduate and undergraduate levels are again being provided by The Society of Naval Architects and Marine Engineers to encourage men and women to pursue studies in the naval architectural and marine engineering or closely related fields. Only United States or Canadian citizens are eligible.

Applications for the graduate scholarships program for the Fall of 1982 may be obtained from Society headquarters at One World Trade Center, Suite 1369, New York, NY 10048. The completed applications should be directed to Mr. Robert G. Mende, Secretary and Executive Director of the Society, at that same address before the closing date of February 1, 1982.

The Scholarships Committee will determine the value of the awards on a case-by-case basis. Each successful candidate may select the institution he or she will attend, subject to the approval of the the Scholarships Committee.

Factors considered in making the selection include scholastic ability, the candidate's capacity to pursue advanced study, ambition, personality, and other qualities indicative of prospective leadership status in the marine industry. For at least one scholarship, recent employment of at least five years' duration in the marine field will be an important factor in selection.

In addition to the graduate program, several undergraduate scholarships of $1,000 each are available for study at the Massachusetts Institute of Technology, the University of Michigan, and the State University of New York Maritime College. Grants-in-aid are being made available at the University of California at Berkeley.

Those interested in the undergraduate scholarships should contact the institutions listed above rather than the Society, since nominations for Society undergraduate funds have been assigned to them. All undergraduate scholarship awards will be subject to the approval of the Scholarships Committee. ‡

Keynotes

The following items of general interest were published between October 23, 1981, and November 19, 1981:

Final rules: CGD 78-171 Drawbridge Operation Regulations; Gulf Intracoastal Waterway, Pinellas County, Florida, November 5, 1981. CGD 81-076 Bridges; Location and Clearances; Advance Approval of Construction Projects, revocation; November 5, 1981. CGD 80-069 Regulated Navigation Area; New Haven Harbor, Vicinity of Tomlinson Bridge, November 16, 1981. CGD 17-81-04 Safety Zone; Gastineau Channel, Juneau, Alaska, November 16, 1981. CGD 80-116 Portable Deadlights on Great Lakes Vessels, November 19, 1981.

Notices of Proposed Rulemaking (NPRMs): CGD 17-81-03 Safety Zone; Gastineau Channel, Juneau, Alaska, November 5, 1981. CGD 81-054 Drawbridge Operation Regulations; Saginaw River, Michigan, November 16, 1981. CGD 2-81-01 Drawbridge Operation Regulations; Muskingum River, Ohio, November 16, 1981.

Notices: CGD 81-083 Coast Guard Academy Advisory Committee, notice of meeting, October 29, 1981. CGD 81-084 Safety and Security Zones, notice of temporary rules, November 5, 1981. CGD 81-085 Towing Safety Advisory Committee (TSAC), notice of meeting, November 9, 1981.

Any questions regarding regulatory dockets should be directed to the Marine Safety Council (G-CMC), U.S. Coast Guard Headquarters, Washington, DC 20593; (202) 426-1477.

* * *

Exemptions Granted to Oceanographic Research Vessels

Merchant seamen are in many cases hired on a voyage-to-voyage basis. Because this type of arrangement makes them, in effect, temporary and itinerant workers, regulations have been promulgated to protect their interests. These regulations cover a number of employment conditions, such as signing on, discharge, payment, and personal outfitting.

Employment conditions differ on oceanographic research vessels. Because of the specialized nature of the work done on such vessels, merchant seamen are hired for extended periods of time on a long-term, contractual basis. This makes regulations governing short-term employment irrelevant.

Recognizing this, the Coast Guard on November 16, 1981, published a final rule (Docket No. 77-081) amending present regulations. The new regulations standardize qualifications for the designation "Oceanographic Research Vessel" and exempt such vessels from the requirements of the protective legislation described above. Vessel operators will be required to submit information on operation of their vessels as research vessels to the local Officer in Charge of Marine Inspection (OCMI). The OCMI will then forward this information to the Commandant with a recommendation for approval or denial of the designation "Oceanographic Research Vessel."

Comments Requested on Changes in Mariner Licensing

Mariners trying to plot their career paths are often frustrated by antiquated regulations and confusing licensing requirements. The Coast Guard, hoping to ease the way, has proposed a set of changes which would greatly simplify the licensing process, providing mariners with a clearly defined path to follow.

Among the goals of this proposed regulatory change are:

1. Establishing a simplified, two-license structure for service on vessels of any gross tonnage operating on the Inland Waters, Western Rivers, or Great Lakes of the United States. This would replace the present four-license system. The two-license system would also apply for service on vessels of up to 1600 gross tons operating in ocean or near-coastal service, so that the new U.S. rules would conform with many international standards. The existing four-license structure would continue to apply to vessels over 1600 tons on offshore routes.

2. Consolidating many existing licenses. As the regulations stand now, the number of licenses, the requirements for them, and the experience necessary to obtain a license are often confusing. Consolidation would allow for a cross-over between licenses and more uniform career advancement. For example, there are

presently 24 different licenses for master, many of which could be grouped together and would be under the new regulations. General licensing requirements, often repeated for many different licenses, would be consolidated into one section of the regulations to eliminate confusion and redundancy. Archaic experience requirements would be revised. For example, under the existing regulations, in order to obtain a license as a master of an ocean or coastwise sail vessel, an applicant must have one year of service on an uninspected ocean or coastwise sail vessel of 500 or more gross tons. No vessels of this type exist under the U.S. flag. This requirement would be dropped.

3. Eliminating the difference between inspected and uninspected vessels for licensing purposes. This would, for instance, provide holders of an Operator-Uninspected Towing Vessel license with a clearly defined path to mate and master.

4. Enabling persons with experience in one broad geographic area to cross over into the adjacent area. A person with an inland route limitation, for example, would be able to cross over into an ocean or near-coastal route. This would give him greater opportunities for career advancement.

The language of the regulations would be simplified, and the changes and amendments to the rules would further clarify licensing requirements.

An advance notice of proposed rulemaking (ANPRM) on this subject was published on October 29, 1981. Comments about the proposed rule (Docket No. CGD 81-059) should be mailed to the Marine Safety Council at the address given above on or before January 27, 1982.

Documentation of Vessels to be Simplified

Documentation of vessels dates back almost two centuries; the first regulations on this subject were passed in 1789. Documentation serves as evidence of a vessel's nationality and allows vessels to obtain preferred mortgages. It is required for vessels operating in certain trades such as fishing or trade on the Great Lakes. Because some of the regulations are so old and only piecemeal attempts have been made to update them, vessel documentation regulations are often confusing and filled with archaic language. Also, the burdensome reporting requirements of the regulations force vessel owners to fill out a myriad of forms.

On July 1, 1982, the Vessel Documentation Act of 1980 becomes effective. This Act mandates the revision and simplification of laws relating to vessel documentation.

In accordance with the Act, the Coast Guard has completely rewritten the rules in clearer language. The new text can be found in an NPRM published November 16, 1981. The rewriting will make it easier to determine which rules apply in a given situation and what is required of a vessel owner. In conjunction with rewriting the rules, the Coast Guard is introducing condensed and simplified documentation forms. These will require only the information specified in the regulations, easing the paperwork burden on the public. Streamlined application procedures will reduce documentation processing backlogs.

Comments about this proposal (Docket No. CGD 80-107) should be sent to the Marine Safety Council at the address given above before January 15, 1981.

Load Line Survey Fees to be Deregulated

If a ship is overloaded with cargo, it will become unstable, endangering both the cargo and personnel. Overloading is prevented by means of a load line assignment which specifies the deepest draft amidships to which a ship can be safely loaded. The majority of such surveys are conducted by the American Bureau of Shipping (ABS), which reserves the right to charge for this service. The fees charged are monitored by the Coast Guard.

Currently, if the ABS wishes to increase its survey fees (which, in these inflationary times, often becomes necessary), the regulatory process takes so long that the new fees have been overtaken by further inflation before they go into effect. In an NPRM published on November 5, 1981 (Docket No. CGD 80-143), the Coast Guard proposed a change in the regulations which would allow the ABS and any other classification society assigning load lines for the United States to raise its survey fees without going through the regulatory process. The new rule would require only the Commandant's approval for an increase in fees.

This change is not meant to imply that load line survey fees will become overly burdensome. The average annual cost of survey fees currently

is only about $100 per vessel, and the price increases are expected to have only a very modest economic impact.

Actions of the Marine Safety Council

October Meeting

CGD 80-107 Documentation of Vessels

An NPRM containing extensive changes to the Coast Guard documentation regulations (Chapter 46 of the Code of Federal Regulations, Subchapter G), was approved by the Council. This project was the result of the Vessel Documentation Act, P.L. 96-594, which becomes effective on July 1, 1982. The Act mandates elimination of unnecessary requirements and simplification of the remaining requirements. (For further details, see the write-up on the preceding page of the Keynotes section)

CGD 81-076 Bridge Location and Clearances, Advance Approval

The Coast Guard is authorized to approve the location and plans of bridges constructed over navigable waters of the United States. Chapter 33 of the Code of Federal Regulations, Part 115.70 (33 CFR 115.70) provides a means for advance approval to be given on bridge construction projects over waterways that are "navigable in law" but not actually navigated by anything but logs, log rafts, rowboats, canoes, and small motorboats. There is no need for the Coast Guard to "approve" bridge locations and construction plans for such waterways. This project, administrative in nature, merely deletes those portions of 33 CFR 115.70 which are not being applied. A final rule was published in the Federal Register on November 5, 1981.

CGD 81-078 Self-propelled Vessels Carrying Hazardous Liquids

This proposal will update 46 CFR 153 by identifying additional cargoes subject to these regulations, correcting minor errors in the text, and relaxing certain existing requirements. An NPRM is scheduled to be published in March.

CGD 81-079 Acceptance of ASME-stamped Power and Heating Boilers

As a part of the Coast Guard's ongoing program to deregulate without sacrificing safety, this project will exempt boilers stamped with the American Society of Mechanical Engineers (ASME) A, E, H, or S symbols from Coast Guard plan approval and shop inspection. A third-party inspection by an ASME code-authorized inspector will be accepted. An NPRM will be issued this summer.

November Meeting

CGD 81-080 Traffic Separation Schemes, Shipping Safety Fairways

As provided for by the Ports and Waterways Safety Act, the Coast Guard undertook a study to determine the need for changes, deletions, or additions to traffic separation schemes and shipping safety fairways in offshore areas. The information compiled is being categorized by Coast Guard District. The project described here is the result of the findings within the Eight Coast Guard District. The following are being proposed:

Two additional anchorages for Sabine Bank

One additional anchorage for Calcasieu Pass/Lake Charles

Repositioning the fairway from the mouth of the Mermentau River to the channel at Lower Mud Lake

Widening the fairway off Southwest Pass

Establishing a Traffic Separation Scheme (TSS) at the entrance to Galveston

The NPRM should be issued in March.

CGD 81-081 Electronic Position Fixing Devices

Presently, 33 CFR 164.41 requires that, for satellite packages installed after June 1, 1982, vessels equipped with a hybrid satellite system install a continual-tracking integrated complementary system that automatically provides position updates at intervals of one minute or less. It also requires that such a complementary system be incorporated in existing packages not later than June 1, 1985. This project will ultimately eliminate those requirements. An interim final rule is to be published this month.

CGD 81-082 Barges Carrying Certain Bulk Dangerous Cargoes

The rules for barges carrying bulk cargoes presenting hazards other than flammability (46 CFR 151) were published in 1970 and since then have had only minor revisions. A number of sections are outdated; other sections are unnecessary. This project will result in a complete revision of 46 CFR 151. An NPRM is not scheduled to be issued until April 1983.

Changes in List of

Navigation and Vessel Inspection Circulars

The December 1981 issue of the Proceedings featured an update of the Coast Guard's list of Navigation and Vessel Inspection Circulars (pp. 238 - 239). A number of changes were taking place as the issue went to press, however, and the list should be adjusted as follows:

10-81 Coast Guard Certification and Inspection of Certain Categories of Existing Vessels

should be added to the list. 10-81 cancels the following circular:

12-65 Alteration or Modification of Existing Cargo or Tank Vessels; Associated Safety Improvements.

The two circulars announced in the Maritime Sidelights section of the December 1981 issue of the Proceedings,

11-81 Renewal of Deck Officers' Licenses

and

12-81 Operators' and Motorboat Operators' Licenses,

cancel the following circulars:

5-62	Renewal of Deck Officers' Licenses—Western Rivers
5-64 CH-1,2	Renewal of Ocean Operators' and Operators' Licenses
8-64	Renewal of Operators' Licenses—Western Rivers
8-64A	Renewal of Operators' Licenses—Western Rivers
7-65 CH-1	Renewal of Deck Officers' Licenses

Two other circulars will be cancelled on the date when the new Inland Navigation Rules become effective on the Great Lakes:

4-62 Renewal of Deck Officers' Licenses—Great Lakes

and

7-64 Renewal of Operators' Licenses—Great Lakes.

The Wake of the TITANIC

by PA3 Jeffrey D. Moore
Assistant Coast Guard Historian

On April 10, 1912, a mammoth ship lay moored at the docks of Southampton. With its sleek shape and its picturesque features, the TITANIC was the pride of not only the White Star Fleet but England as well. Soon the ship would be making history—and changing maritime laws.

As the passengers boarded the TITANIC, one woman asked a steward whether the ship was really safe. The steward laughed and replied, "Lady, even God Himself couldn't sink this ship." As the officers supervised the boarding of the massive liner, some of them knew there were enough lifeboats for only half the passengers. They were not worried, though, because they believed the ship was unsinkable.

The TITANIC was scheduled to sail from Southampton, England, to New York. Its captain, Commodore Edward J. Smith, with his 45 years of experience, was considered the best in his profession. It was only fitting, therefore, that he command the queen of the ocean on his final cruise before retirement. The rest of the officer corps had been handpicked by the White Star Line executives. The officers were well seasoned in the handling of passenger liners.

By 12:00 noon all 2,201 passengers and crewmembers were aboard, and the 50,000-ton colossus sailed away to keep its appointment with destiny.

The first few days of the trip passed uneventfully, as the passengers settled into the routine of life on board a luxury liner. The TITANIC began to receive word of icebergs from other vessels on the third day of its voyage. The captain remained unperturbed, and the TITANIC continued to cut cleanly through the waters of the Atlantic.

On the night of April 14th the TITANIC once again received notice of icebergs from other vessels. The captain did not slow the huge vessel but did add extra lookouts to the watch. At 11:40 p.m. a fog settled around the ship. Then, from the lookout, came the cry, "Iceberg dead ahead, sir!" The First Officer immediately gave the order to bring the wheel hard over. In the next instant the lever was thrown to make the engines go full astern. But it was too late. By the time the huge liner responded, its hull was scraping the iceberg.

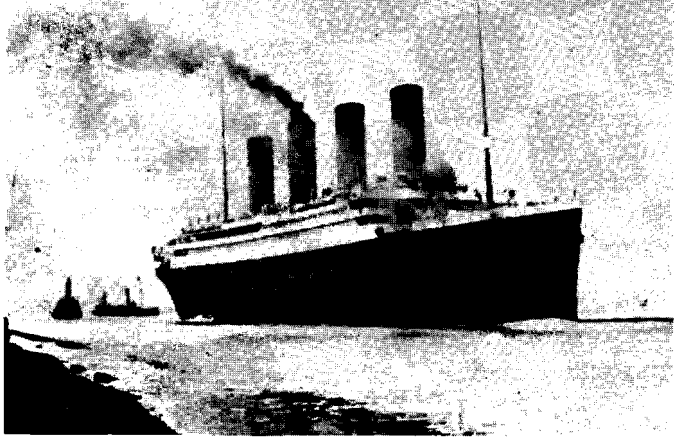
The iceberg ripped a huge, 300-foot-long gash in the side of the vessel. The engines were stopped, and Captain Smith came to the bridge. After he saw what had happened, he went to inspect the damage. It was bad, much worse than he would have anticipated. Smith realized

he could do nothing. The TITANIC, the "unsinkable" ship, would go under. The captain ordered general quarters to be sounded and distress signals to be fired.

The stewards roused the passengers from their cabins and ushered them to the decks from which the lifeboats were accessible. The passengers, for the most part, could not or would not comprehend the extent of the danger. Many refused to enter the boats; others entered hesitantly. In the background, distress rockets could be seen exploding in the air and the ship's band could be heard playing. By the time all of the lifeboats had been launched, the ship was leaning heavily into the water. The people that remained on board hoped the vessel would sink only so far and then hold. Their hopes died as the TITANIC took its final plunge into the sea. It took only two hours and forty minutes for the unsinkable TITANIC to sink.

The people that did survive in the lifeboats were, in fact, very lucky. In the early 1900s the percentage of survivors in maritime accidents was very low. During this era, only one out of three lifeboats came away from a casualty without any severe damage or loss of life. According to "The Return of Casualties and Loss of Life," 40,860 lives were lost on merchant vessels between July 1, 1914, and December 31, 1918. Most of the vessels lost had enough lifesaving apparatus on board. Because of the prevailing conditions, however, lowering the lifeboats proved disastrous.

Many factors could adversely influence the launching of a lifeboat at the time of distress. One major problem could be the listing of the vessel. If the vessel listed more than 35°, it was almost impossible to launch the lifeboats on the high side of the ship. Listing also scared many of the members of the crew, as they wanted to stay on the high side of the ship instead of lowering the lifeboats at the low end, where it would be a straight drop to the water.



The luxury liner TITANIC departs Southampton, England, on its maiden—and what was to be its final—voyage.

Another adverse condition might be the sea state. In many cases the ocean was rough. This caused the vessel to pitch and roll, which, in turn, caused the wooden lifeboats to crash against the hull of the ship and shatter into driftwood. The rough water also made it difficult to lower a lifeboat into the sea, since the entry had to be timed to meet the swells. The boat had to be placed on top of the wave and the lowering lines let go at that very moment. If the timing was not perfect, the lifeboat might swamp or be smashed against the hull and all could be lost.

Such adverse conditions did not prevail during the TITANIC disaster. The night was clear, and the ocean was abnormally calm. The conditions were perfect for launching lifeboats. This was lucky for the crew of the TITANIC because they had had no previous drill or practice on the ship's davits. Had the night been rough, the loss of life would have even been more disastrous.

The TITANIC had 20 lifeboats, fourteen of which were 30 feet long and 9 feet wide and had a capacity of 65 people each. The ship had two 25-footers which could hold 40 persons each. Finally, the TITANIC had four Engelhardt collapsible boats, 27 feet long, which could hold 47 people each. In all, the boats could hold 1,178 people, scarcely more than half the people on board. The TITANIC also had 3,560 Board-of-Trade-inspected life jackets. These were placed throughout the ship's sleeping quarters.

The boats had been made to comply with the requirements of the English Board of Trade. The stem and stern posts were made of oak and the keels of elm. The hulls of the boats were built of yellow pine planks, overlapped and double-fastened with copper nails, clinched over roofs. The timbers were made of elm and spaced about nine inches apart. The seats were made of pitch pine secured with galvanized iron double knees. All of the lifeboats were fitted with Murray's disengaging gear, which was capable of freeing both ends of the boat in case of emergency. This gear was fastened at suitable distances from the forward and after

ends of the boats. The lifelines were fitted around the gunwales of the lifeboats.

The lifeboats were stowed on wooden hinged chocks on the boat deck. Fourteen were hung inboard on davits, seven on the port side and seven on the starboard side of the liner. There were two emergency boats. They were in davits also but hung outboard, one on the port side and one on the starboard side. Of the other four boats, which were stowed on the boat deck, two were placed on top of the officers' cabin roofs.

All of the equipment used in the lifeboats met with the specifications of the Trade Board. The equipment included sails for each lifeboat, covers, a sea anchor, a boat compass with a fitting to hold it, and a provisional tank and water beaker.

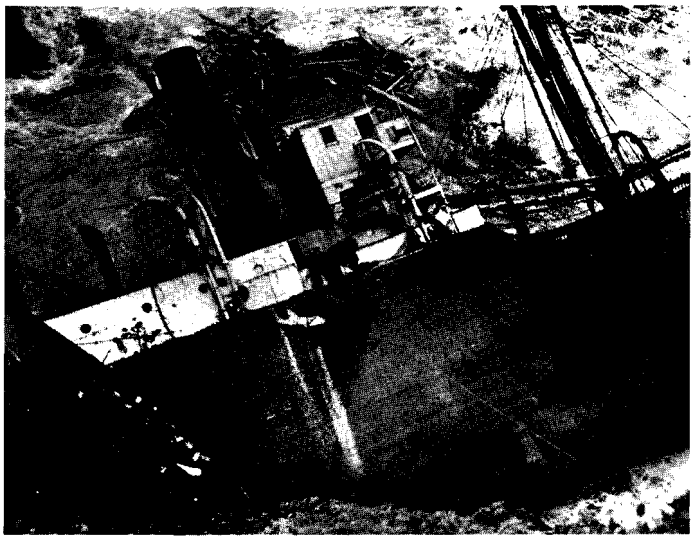
The TITANIC also had one of the safest and most modern davits that existed at the time. The davit was called "the Welin Davit" after its inventor. One of the features of this davit was its flexibility. The davits were capable of moving in many directions and could be easily stored. The davits were also designed to provide whatever clearance was necessary for a boat to clear the side of the vessel. The lifeboats on the davits could be stored in many positions or at many angles on the davits, thus leaving more deck space. The quadrant could be moved to 90^{o} angles. This gave the davit more versatility and maneuverability in the launching of lifeboats. Although the davits were not tested by rough weather during the TITANIC disaster, the Welin davits were one of the reasons that every lifeboat launched on that fateful night made it to the water without mishap.

As mentioned previously, there was enough room in the lifeboats for 1,178 people. Many of the passengers were convinced the TITANIC could not sink, however, and 467 spaces went unfilled. The boats were thus filled to less than two-thirds of their capacity, and 467 people died needlessly.

From November 12, 1913, to January 20, 1914, shortly after the sinking of the TITANIC, the International Conference on the Safety of Life at Sea was held in London. Most of the principal maritime countries were represented. The purpose of this meeting was to raise the level of safety on board merchant vessels.

The following recommendations were made:

1) Vessels should provide enough lifeboats, floats, rafts, and line-carrying projectiles and means for propelling them for everyone on board.
2) Every vessel should carry one life preserver for each person on board.
3) Every vessel should be equipped with suitable pipes (water lines) leading to any and all sections of the vessel for extinguishing fires.
4) Vessels should have a sufficient number of hand pumps (determined according to the number of crewmembers and the type of cargo being carried).
5) Vessels should have a sufficient number of fire extinguishers.
6) Every motor or steam vessel over 65 feet long should carry an extinguisher capable of putting out a gasoline fire.



This photograph of the SS LAMUT shows what can happen when the lowering of the lifeboat (vessel at lower left) is not timed correctly.

A number of other suggestions were made at the meeting as well. The United States failed to ratify the international convention, but it did accept in large measure the new guidelines.

Even though the TITANIC went down many years ago, it is still one of the most famous sinkings of all time. Although the losses were tragic, the lessons learned from the sinking served to advance the cause of marine safety. The International Ice Patrol was formed in order to study the flow and structure of icebergs. Strict safety laws were passed regarding the number of lifeboats and other flotation devices to be kept on board.

The sinking of the TITANIC also served to remind man that, no matter how grand the ship, safety on the world's seas should never be taken for granted. ‡

Coast Guard Puts a Patrol "on Ice"

Of all the peacetime hazards of the sea, none is more fearsome, unyielding, or treacherous than the iceberg. Breaking off the massive Greenland glaciers, mammoth bergs, frequently as long as a city block and half as high above the water, are carried along by ocean currents.

While icebergs are a constant menace in the Arctic, some are carried far south to the vicinity of the Grand Banks of Newfoundland by the cold, southward-flowing Labrador Current. Here lie the great circle shipping tracks between Europe and the major ports of the northeast United States and Canada.

The U.S. Coast Guard formally commences the seasonal service of ice observation and International Ice Patrol whenever the presence of ice begins to threaten these primary shipping routes. The threat of ice south and east of Newfoundland is typically present during the months of February through July, but the Patrol is flexible and commences operations when conditions dictate. The 1972 season, the longest on record, ran from February 29th through September 4th, 189 days. Except during unusually heavy ice years, the Grand Banks are normally ice-free from August through January.

HISTORY OF THE ICE PATROL

It took one of the greatest marine disasters of all time to arouse sufficient public demand for international cooperative action to deal with the iceberg hazard. The sinking of the SS TITANIC on April 15, 1912, was the prime impetus for the establishment of the International Ice Patrol.

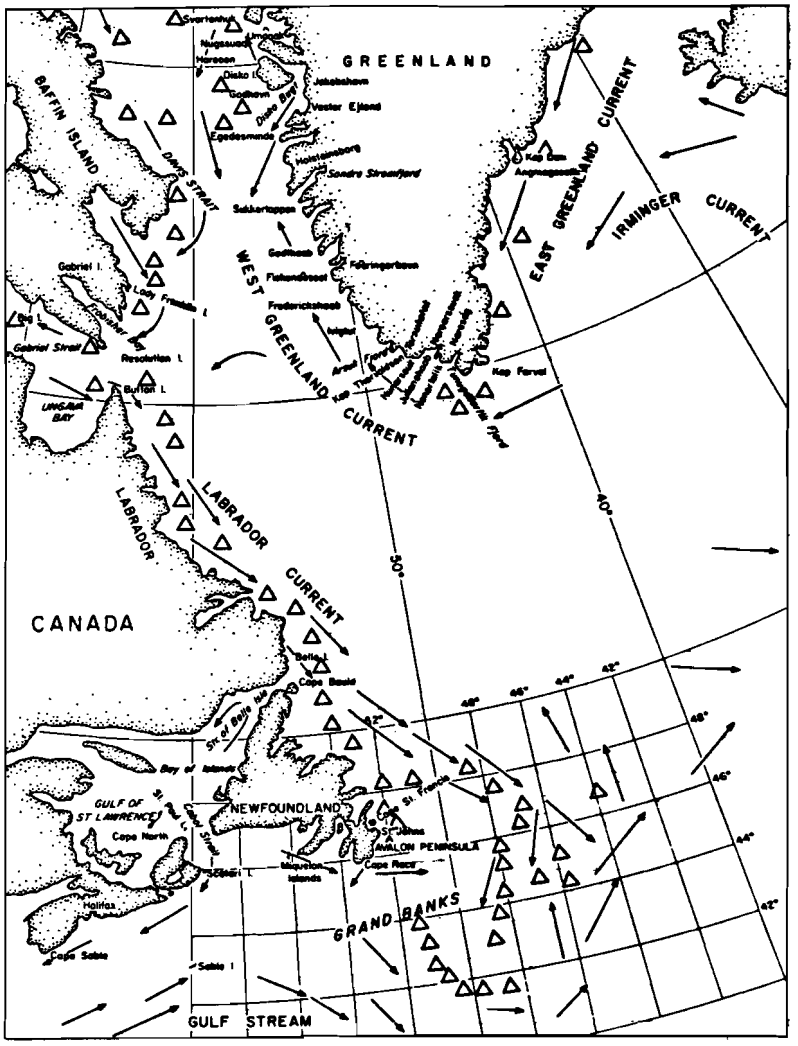
On its maiden voyage from Southampton England, bound for New York, the TITANIC collided with a medium-sized iceberg just south of the Tail of the Grand Banks. It sank within two hours and forty minutes. Although the night was clear and seas were calm, the loss of life was enormous. More than 1,500 of the 2,201 passengers and crew perished. The TITANIC, the brand-new flagship of the White Star Line, was the largest passenger liner of its time, displacing 66,000 tons and capable of sustained speed in excess of 22 knots. It had been built to incorporate the latest developments in safety design and featured compartmentation and such innovations as automatically closing watertight doors. It is ironic that publicity regarding these features had given it

the reputation of being unsinkable.

The loss of the TITANIC gripped the world with a chilling awareness of an iceberg's potential for tragedy. The first Safety of Life at Sea (SOLAS) conference was held in 1914.

After the TITANIC disaster, the U.S. Navy assigned the ships CHESTER and BIRMINGHAM to patrol the Grand Banks for the remainder of 1912. In 1913, the Navy could not spare ships for this purpose, so the Revenue Cutter Service (the forerunner of the U.S. Coast Guard) assumed responsibility, assigning the Cutters SENECA and MIAMI to conduct the patrol.

From the inception of the Ice Patrol until the beginning of World War II, ice conditions were monitored from two surface patrol cutters alternating surveillance patrols of the southern ice limits. In 1931 a third ship was added to perform oceanographic observations in the vicinity of the Grand Banks. After World War II, aerial surveillance became the primary ice reconnaissance method. Surface patrols were phased out; from that point on, that type of patrol was used only during unusually heavy ice years or extended periods of reduced visibility. Use of the oceanographic vessel has continued. The aircraft has distinct advantages for ice reconnaissance, since it can cover a much greater area in a relatively short period of time.



Arrows show the drift of icebergs from their source into the North Atlantic Ocean.

SEA ICE

Ice floating in the ocean is of two general types. That forming over land masses, such as Greenland, is known as glacial ice. That originating and developing entirely in the sea itself or in the waters along a coast is termed sea ice.

The two chief sources of arctic sea ice for the western Atlantic are the Davis Strait and Hudson Strait. The winter ice stream from Baffin Bay reaches Hudson Strait in late October or early November. The streams move down the Labrador coast, growing as new ice forms along the way. The first ice to arrive off Belle Isle in December or January is open strings of young ice. Some of this ice enters the Strait along the northern side and soon fills the entire Strait, closing the Belle Isle route to navigation until late May or June.

By late January or early February, this ice has reached the northern edge of the Grand Banks, and by March the pack has spread generally over the northern part of the Banks, often as far south as latitude 46 N.

To the navigator, there are two reliable signs of sea ice. One is iceblink or ice sky. The presence of any appreciable expanse of sea ice produces characteristic light effects in the sky above it which, once seen and recognized, can never be mistaken. The phenomenon is caused by the very high percentage of light reflected from the ice surface as compared to that reflected from the surrounding sea and is observed sometime before the ice appears over the horizon. On clear days when the sky is mostly blue, iceblink appears on the horizon in the direction of the ice as a luminous yellow haze, contrasting sharply with the rest of the horizon. It is brighter at the bottom and shades off upward; its height depends on the proximity of the ice field. Horizontally, the effect extends only as far as the ends of the ice. On days when the sky is overcast or there are low clouds, the yellow band is mostly absent, but

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the iceblink appears as a whitish glare on the lower surface of the clouds above it. Under certain conditions of sun and sky, both effects may occur at once, a sure indication of field ice just over the horizon. Here might also be mentioned the term "water sky." This effect is just the reverse of ice sky. If the observer is completely surrounded by ice, or nearly so, the bank of iceblink is sharply broken where leads of open water occur in the icefield. In contrast to the iceblink, the "water sky" above such open water appears almost black.

The second reliable sign of sea ice is the abrupt smoothing of the sea and the gradual lessening of the ordinary ocean swell. The ice cover prevents the wind from acting on the sea; an abrupt smoothing is thus a good indication of sea ice to windward. As for the icefield itself, its leeward edge is apt to be stringy and loose, while the windward edge will usually be sharply defined and closely packed. Pieces of ice to leeward of the pack give warning of an icefield's proximity. (The absence of pieces of ice should not be taken as a sign that no ice is near)

ICEBERGS

Glacial ice is formed when snow accumulates and is gradually compressed into a solid mass of large granular ice. This process produces a structure quite different from sea ice. Air trapped within the ice forms a high density of tiny, high-pressure air pockets, giving the ice a milky appearance and causing it to effervesce as it melts. Since it is formed over land, glacial ice is essentially salt-free.

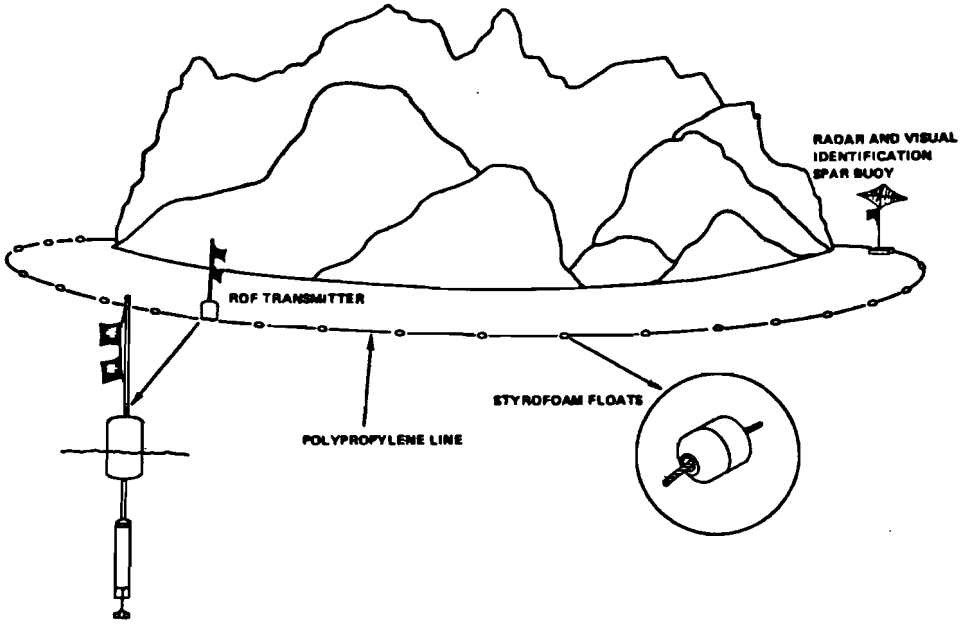
Greenland is covered with an ice cap of glacial ice nearly two miles thick in some locations. Icebergs are produced when the buoyant forces of water act to break off sizable pieces of ice from the seaward end of these glaciers.

Those bergs that reach the North Atlantic Ocean have their principal origin in the 100 tidewater glaciers of West Greenland, where between 10,000 and 15,000 bergs break off, or are "calved," each year. It is estimated that these account for 85 percent of the icebergs which reach the Grand Banks of Newfoundland.

Icebergs originating in West Greenland are initially carried north along the Greenland coast around to the western side of Baffin Bay and then south along the east coast of Baffin Island, Labrador, and Newfoundland to the Grand Banks. Because they have deep drafts of 100 to 200 meters, the larger bergs are often slowed by grounding. Their total drift is about 1,800 miles (over 3,000 miles for East Greenland bergs), and many take from 11 months to as long as 3 years to reach the North Atlantic shipping lanes.

On the average, about 1,000 bergs each year survive to reach the region off Belle Isle. The Patrol maintains counts of the number of bergs crossing the 48th parallel.

Icebergs are sighted at various distances, depending on the state of visibility and the height of the berg and the observer.



One iceberg-tagging scheme employed a floating-line technique.

On a very clear day large bergs can usually be seen by an observer with height of eye 70 feet at a distance of 18 miles. The tops of bergs have been seen at 9 to 11 miles when the weather was clear but there was a low-lying haze around the horizon. In a dense fog, a berg cannot be seen at any appreciable distance ahead of the ship. If seen at all, it may appear as a luminous white mass when the sun is shining. Without the sun, it is dark and somber-looking. In a light, low fog, an observer can see a berg from aloft sooner than from deck. On a clear, dark, starlit night, a lookout will not pick up a berg at a distance greater than one-fourth mile. If the

berg's bearing is known, however, an occasional light spot is discernible with binoculars at a distance of a mile because of the swell breaking against the berg. With a full moon and favorable conditions, a berg can normally be seen at greater distances, possibly 3 miles. Much depends on the relative positions of moon, berg, and ship.

Echoes from the ship's whistle are not to be relied upon, both because the shape of the berg may prevent any echo and because echoes are often produced by fog banks.

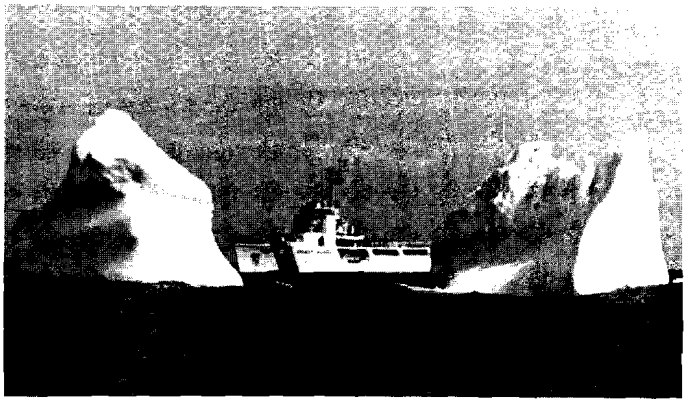
SERVICES FOR THE MARINER

The International Ice Patrol typically commences services for the annual ice season in mid-March. The season usually runs through mid-July. Wide dissemination of the services available to the mariner and the maritime community concerning the location of icebergs and icefields in the North Atlantic is provided by Local Notices to Mariners and radio broadcasts. Merchant vessels are requested to send reports of ice sightings and sea surface temperatures to U.S. and Canadian Coast Guard communications stations for relay to the Commander of the International Ice Patrol. Details on stations, times of broadcast, frequencies, etc., will appear in the next issue of the Proceedings.

RESEARCH AND DEVELOPMENT

New techniques for improving Ice Patrol efficiency and effectiveness are constantly being developed and put into use as man's understanding of the iceberg menace continues to expand. In its efforts to safeguard merchant shipping, the Coast Guard keeps abreast of the latest scientific developments. The Ice Patrol aircraft now use up-to-date electronic navigational equipment which makes it possible to determine iceberg positions with great accuracy. Research and development efforts include ice deterioration studies, Greenland glacier surveys, and numerous and varied oceanographic investigations. The Ice Patrol has also attempted and is continuing to experiment with tagging of icebergs with both dye "bombs" and more recently radio transponders (see below). Test and evaluation is proceeding on remote sensing equipment such as Side-Looking Airborne Radar (SLAR) in the hope that it will enable the Ice Patrol to detect and identify icebergs in reduced visibility.

The Coast Guard began a project in 1974 to determine the best way to tag an iceberg for identification and tracking. The first approach was to encircle an iceberg with a floating line and attach a radio direction-finder transmitter and radio reflectors. This method met with limited success, since icebergs deteriorate and are likely to roll, thus slipping the tagging array. During 1975 instrument packages were tethered to icebergs using a large steel dart dropped from aircraft. This procedure solved some of the problems of iceberg tagging associated with rolling and melting but not those associated with calving.



The U.S. Coast Guard Cutter VIGOROUS is framed in the jaws of a twin-peaked iceberg near a North Atlantic shipping lane. Photo by Seaman Richard J. Geisman

Research continued along these lines until the 1979 season, when significant changes were made in the Ice Patrol mode of operation. A new computer model to predict the drift of icebergs was placed in operation by the Coast Guard and used throughout the season. An ocean current model of the North Atlantic was generated using information obtained since 1964 to predict current motion and thus iceberg drift. Perhaps most significantly, traditional standard oceanographic surveys were replaced with satellite-tracked buoys as the primary method of measuring currents and verifying the International Ice Patrol current file. A continuing evaluation of the iceberg drift model is being conducted. Observed iceberg drift tracks are compared to model-generated paths to estimate the model accuracy. Overall, the satellite-tracked-buoy system, as compared to the old survey method, provides more accurate and much more timely current measurements at a reduced cost. As a result of the International Ice Patrol's ongoing efforts to increase its effectiveness, the future for the continued safety of shipping from the menace of icebergs appears assured. ⚓

New System Makes Lifeboat Launching Safer

In October 1975 leading manufacturers of life-saving equipment, in conjunction with the British Department of Trade, carried out extensive and successful sea trials of a prototype launch/recovery system aboard the fishery support ship MIRANDA.

The MIRANDA davit, named after that fishery support vessel, is the result of years of experience in the development of davit systems. The MIRANDA system comprises fixed ramp arms, winch, motor, and a survival craft in its own launch/recovery cradle. The craft is stowed at the embarkation deck position in its cradle, and it is this cradle which is lowered down the face of the fixed ramp arms, at the bottom of which the craft is released. The cradle with its rollers thus provides protection for the boat when it is being lowered, rendering it unnecessary to turn the craft out clear of the ship's side. This eliminates the need for a davit which turns from the inboard to the outboard position and all the maintenance which comes with that type of equipment.

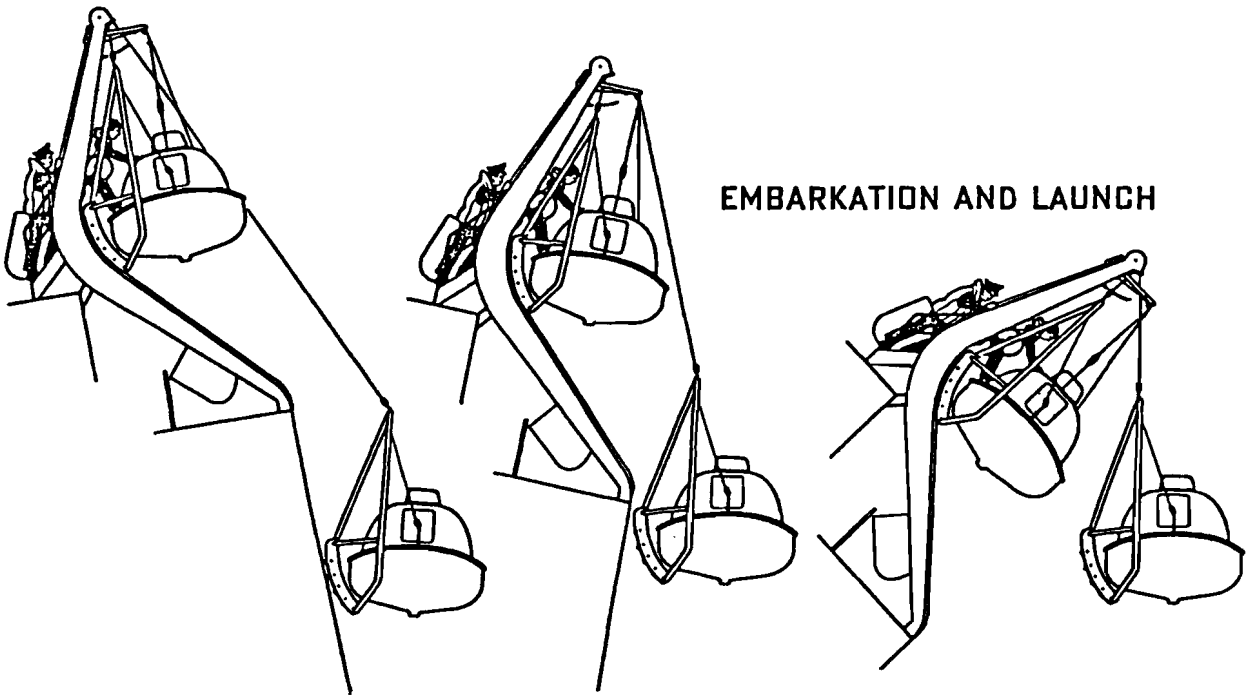
In addition to the protection it affords the survival craft during launch and recovery, the MIRANDA system has the following advantages:

- The craft can be launched with the parent vessel in a 30° high or low side list accompanied by 15° trim either fore or aft (this exceeds international maritime regulations, which require that a davit work with a 15° list and 10° trim).

- The cradle allows personnel to be loaded while the boat is in a fully stowed position. The launching is then controlled by the helmsman from within the craft.

- Other than the rubber-tired wheels on the cradle, the MIRANDA system has very few moving parts. The wheels enable the cradle, with the craft mounted in it, to move down the trackways, over the side of the ship, and into the water.

- The boat's gripes automatically disengage themselves as the boat moves down the



trackways. Personnel inside the boat disengage it from the cradle by actuating the lever inside the craft to simultaneously operate the release hooks at each end.

- Because of the reduced number of moving parts, the maintenance required to keep these systems in first-class working order is less than that needed for conventional davit systems.

- Since the craft is protected by the cradle, the lifeboats can be launched while the parent vessel still has some way on, before coming to a complete stop. Launching thus does not require the vessel to be dead in the water.

- Recovery of the craft is simple and quick (three minutes or less, depending on the condition of the seas). Hook-up is made by engaging a lightweight snap hook on the recovery pendant to the falls above the cradle; the other end of the pendant is placed into the release hooks.

  On hoisting, the snap hooks slide down the fall and become fixed on the head of the cradle. The boat is thus guided back into the cradle, and hoisting back to the embarkation deck is achieved. The transfer of the boat to the launching pendant in the cradle is made at the davit head in a quick and simple procedure.

- The launch/recovery winch includes a centrifugal brake to maintain a constant lowering speed of 120 feet per minute when the craft is fully laden. (This speed can be increased to accommodate changes in regulations.) The main "fail safe" holding brake, which is operated by the helmsman from within the craft, can be used to stop descent of the craft at any point; he simply releases the brake control wire. Lowering is resumed when he again pulls the wire. This feature enables the helmsman to release the craft at the most opportune moment in the prevailing sea conditions and immediately steer away from the danger area at maximum speed.

- For shipyards, the big advantage is the ease of installation of the simple MIRANDA davit.

One of the most important features of the new davit is the fact that a MIRANDA operation does not require that any crewmembers remain on deck, descending later to the boat via a ladder or manrope. In an emergency, all personnel can exit the ship in the lifeboat together.

To date, the MIRANDA-type davit has been successfully used by the U.S. Navy, the Norwegian Navy, the German Navy, the Japanese Coast Guard, hydrographic and research vessels, chemical carriers, and tankers. ⚓

Merchant Marine License Statistics Fiscal Year 1981

Merchant Marine Officer Licenses Issued

Deck

GRADE	ORIGINAL	RENEWAL
MASTER:		
Ocean	488	1,168
Coastwise	18	62
Great Lakes	21	65
Bays, sounds, and lakes	62	160
Rivers	45	114
Chief Mate:		
Ocean	233	196
Coastwise	2	8
Great Lakes	4	4
Bays, sounds, and lakes	17	21
Rivers	27	39
2nd Mate:		
Ocean	336	240
Coastwise	1	4
3rd Mate:		
Ocean	531	306
Coastwise	18	9
Pilots:		
Great Lakes	78	216
Bays, sounds and lakes	444	329
Rivers	221	276
Master (uninspected vessels)	549	337
Mate (uninspected vessels)	217	63
Motorboat Operator	4,878	3,233
Radio Officer	68	269
	8,258	7,119

GRAND TOTAL 15,377

Merchant Marine Officer Licenses Issued

Engineer

GRADE	ORIGINAL	RENEWAL
STEAM		
Chief Engineer:		
Unlimited	150	1,123
Limited	7	45
1st Assistant:		
Unlimited	216	356
Limited	2	18
2nd Assistant:		
Unlimited	384	613
Limited	0	4
3rd Assistant:		
Unlimited	650	834
Limited	3	8
	1,412	3,001
MOTOR		
Chief Engineer:		
Unlimited	188	348
Limited	32	224
1st Assistant:		
Unlimited	79	83
Limited	10	53
2nd Assistant:		
Unlimited	143	96
Limited	7	16
3rd Assistant:		
Unlimited	575	870
Limited	4	41
	1,038	1,731
Uninspected Vessels:		
Chief Engineer	234	151
Assistant	125	42
	359	193
	GRAND TOTAL	7,734

Towboat Operators Licenses Issued

	CANDIDATES	PASSED
Operator	1,847	1,057
2nd Class Operator	665	438
Endorsements	247	210
	2,759	1,705

TOTAL LICENSES INCLUDING RENEWALS: 24,816

New Reports Available from Ship Structure Committee

The Ship Structure Committee recently published three new technical reports which are available free of charge:

SSC-300 "Summary of Nondestructive Inspection Standards for Heavy Section Castings, Forgings and Weldments" presents a survey of state-of-the-art techniques, methods, and practices being employed in the nondestructive examination of such vessel components as stem and stern frames, rudder horns, stern tubes, tailshafts, propellers, and engine parts.

SSC-301 "Probabilistic Structural Analysis of Ship Hull Longitudinal Strength" offers a computer program for the analysis of uncertainties associated with ship hull strength. Factors considered include control of material properties, tolerances, corrosion, and cracking.

SSC-302 "Computer-Aided Preliminary Ship Structural Design" is an evaluation of current trends in computer-aided design and their technical and economic impacts on preliminary structural design of ships. An extensive listing of existing programs is included.

For copies of these reports or further information contact LCDR David B. Anderson, Secretary, Ship Structure Committee, U.S. Coast Guard (G-MMT-4/13), Washington, DC 20593.

Chemical of the Month

Acetic Anhydride: $(CH_3 CO)_2 O$

(often abbreviated Ac_2O)

synonyms:	acetyl oxide acetic oxic ethanoic anhydride
Physical Properties	
boiling point:	140°C (284°F)
freezing point:	-73°C (-99°F)
Threshold Limit Values (TLV)	
time weighted average (TWA):	5 ppm or 20 mg/m^3
short term exposure limit (STEL):	none established
Combustion Properties	
flash point (cc):	49°C (120°F)
autoignition temperature:	390°C (734°F)
Flammability Limits in Air	
lower explosive limit (LEL):	2.9% vol.
upper explosive limit (UEL):	10.3% vol.
Densities	
liquid (water = 1.0):	1.08
vapor (air = 1.0):	3.5
Identifiers	
U.N. Number:	1715
CHRIS Code:	ACA

Acetic anhydride is a dangerously acidic, colorless liquid made from either acetone or acetic acid (the latter substance, in dilute solution, is vinegar). Production of acetic anhydride dates back to the middle of the nineteenth century. About 660,000 tons were produced in 1975, but production is now declining, and significant overcapacity exists in the industry. Ninety-five percent of all acetic anhydride is used in making such cellulose esters as cellulose acetate, a substance used as a photographic film base, a thermoplastic, and an ingredient in lacquer, among other things. Lesser quantities are used to make such products as aspirin (chemically speaking, aspirin is acetylsalicylic acid) and textile-sizing agents. The chemical is also used in electrolytic polishing of metals.

Acetic anhydride is a dangerous substance. Breathing acetic anhydride vapor can produce changes in blood chemistry and in the nervous system. The liquid penetrates the skin rapidly and results in painful burns and blisters. Chronic exposure causes dermatitis. Special care is needed in protecting sensitive tissues of the eyes, mouth, and nose. Low concentrations can result in acute irritation of the eyes. Protective measures for persons handling acetic anhydride range from gloves, masks, goggles, and face shields to impervious clothing, head covering, and protective footwear, depending on whether someone is merely in the vicinity of the chemical or working directly with it. Fortunately, the vapor has a penetrating, choking odor (it has been described as smelling like "pungent vinegar") and serves as an effective warning. Anyone who smells it should leave the area immediately or protect his eyes and respiratory system. First aid for injurious exposure consists of flushing any affected tissue with water for at least 15 minutes. Medical attention should be sought immediately.

Acetic anhydride is flammable and, in certain situations, can be explosive. The explosiveness is a result of the fact that acetic anhydride is an effective oxidizer (it reacts violently with many materials). Mixtures with nitric acid are particularly dangerous and are said to be more sensitive than nitroglycerine. Acetic anhydride vapor is denser than air and thus tends to accumulate in low places. The flash point (the temperature at which the chemical gives off a vapor sufficient to form an ignitable mixture with the air near its surface) is relatively low--49°C (120°F). Sources of ignition must thus be kept away from areas where vapor may collect. Water spray is probably the best means of controlling an acetic anhydride fire in the open or in an open container, but caution should be exercised with confined spaces such as tanks. Water reacts with acetic anhydride, causing it to decompose to acetic acid; a considerable amount of heat is generated in the process, so if water gets into an acetic anhydride tank, the pressure resulting from the chemical reaction could cause an

explosive rupture. Acetic anhydride fires can be fought with carbon dioxide, dry chemical, or alcohol foam, in addition to water spray.

Because of its severe hazards, acetic anhydride is rated a Category C Pollutant by both the Environmental Protection Agency and the Inter-Governmental Maritime Consultative Organization. The Department of Transportation has designated it a corrosive material (because it is so corrosive, it must be carried in tanks made of aluminum, stainless steel, or steel covered with a protective lining or coating). The Coast Guard regulates the carriage of acetic anhydride by barge and ship in Subchapter O of the Code of Federal Regulations.

Alan Schneider, Sc.D., and Curtis Payne, B.A.
Hazard Evaluation Branch
Cargo and Hazardous Materials Division

* * * * *

Lessons from Casualties

AMMONIA IS DEADLY

A recent fatality on a tuna seiner indicates a danger that may not be recognized by fishermen and others who work around refrigeration machinery.

During a repair and maintenance period in port, a member of the vessel's engineering department was cleaning a filter in the ammonia refrigeration system. The filter, which served to remove oil and particulates from the ammonia before it entered the condenser, was located downstream from the compressor. When the filter was removed from the system, it was placed in a bucket of water. In spite of the water, it gave off so much ammonia that people standing nearby had to back away. Neither the oiler cleaning the filter nor the chief engineer who had disassembled the system sensed any danger. Strong ammonia fumes were not thought to be unusual; those present knew where the breathing apparatus was stowed and had been told to use it or leave the space if necessary; the manufacturer's maintenance instructions including safety measures were being followed. For routine maintenance such as this, there was no recommendation for personnel to wear breathing apparatus. The oiler never finished cleaning the filter. He became ill and went to the head on the main deck. He complained of dizziness and difficulty breathing and was brought to the nurses' station, given oxygen, and then quickly taken to the hospital. Two hours after starting to clean the filter, he was dead.

In the report of the investigation, a senior Coast Guard Marine Safety Officer commented: "On every tuna fishing vessel I have been on board there were ammonia fumes. Every marine surveyor who works with the tuna fleet that I have talked to about these vessels says that ammonia fumes are ever present, in greater or lesser degree, on board. Since ammonia fumes are ever present in small degree, the crew learns to live with them. This is a case of living so close to a potential danger that it is not noticed when the danger creeps up until someone gets hurt." This probably applies to more than just tuna vessels, and it is frightening to think how many people are working right on the edge of serious injury or death every day.

SOME FACTS ABOUT AMMONIA

At room temperature and atmospheric pressure, ammonia is a gas. It can be liquefied relatively easily by cooling or pressurizing. This makes it very good for a refrigerant.

Ammonia dissolves in water very easily and is often used in this form. Both the aqueous solution and the gas (which can be given off by the aqueous solution) can be harmful.

Ammonia is a severe eye hazard and can cause serious injury within a very short time. Eye injuries constitute the most serious hazard of ammonia in terms of possible permanent disability. To prevent blindness, wash eyes with water immediately (seconds count, so carry emergency water); continue for 15 minutes. (For further details, consult National Institute

for Occupational Safety and Health publication No. 74-136, "Criteria for a Recommended Standard—Occupational Exposure to Ammonia")

Ammonia can cause burns to the skin and do severe damage to the respiratory system. Destruction of the respiratory system is the usual cause of death in the case of exposure to high concentrations. Long-term or permanent damage can also occur.

The odor threshold (least detectable odor) of ammonia in air is in the range of 20 to 50 ppm (parts per million), depending on the sensitivity of the individual.

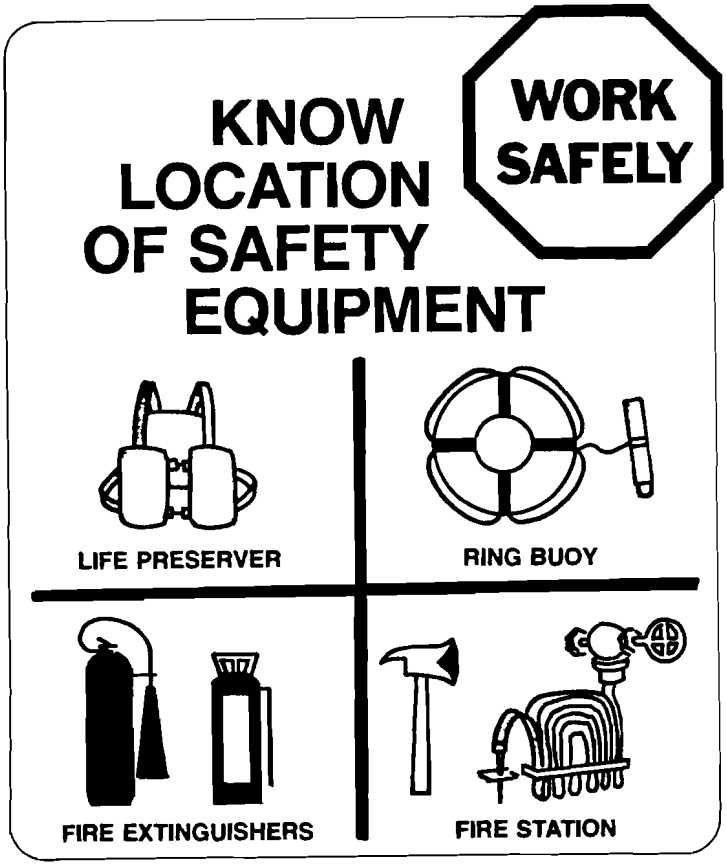
The best available information about the maximum safe limits for exposure to ammonia are the standards set by the American Conference of Governmental Industrial Hygienists (ACGIH) for the protection of workers from both chronic (long-time, low-concentration) and acute (short-time, high-concentration) exposure. The ACGIH recommends that workers be exposed to no more than an average of 25 ppm (0.0025%) for an 8-hour day in a 40-hour week. This is called the Threshold Limit Value - Time Weighted Average, and its purpose is to protect against the development of chronic illneses over an extended period of time. The maximum concentration to which a worker can be exposed for up to 15 minutes before experiencing irritation, irreversible tissue change, or impairment of judgment is 35 ppm (0.0035%). The short-term maximum of 35 ppm must not occur more than 4 times a day, and there must be one full hour between these exposures. Note that this standard does not apply to continuous exposure for full days as might occur on vessels.

Since calibrated instruments capable of calculating time-weighted averages are probably not available on most vessels, the above facts can be combined for a "rule of thumb": if you can smell ammonia, it has reached the maximum level normally allowable in the air. Short exposure to slightly higher levels is acceptable if offset by additional time in pure air. If irritation, burning or discomfort occurs, the concentration is too high. Leave or get out the breathing apparatus immediately. For even higher concentrations, a breathing apparatus is not enough; a full protective suit is needed to prevent burning of the skin.

Signs of irritation or health problems have been observed at the lower end of the range at which the odor of ammonia is detectable.

SPECIAL DANGER ON VESSELS

Shore-based industries are advised to store ammonia outside, clean equipment outdoors, and maintain good ventilation under all circumstances. Frequently, this is not possible on vessels, particularly where the systems are all below deck. In the confined spaces on vessels, all but the most minor releases of ammonia almost automatically become life-threatening events.



Produced as part of the Basic Safety Program for the Barge and Towing Vessel Industry by
THE AMERICAN WATERWAYS OPERATORS, INC.
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AMVER: Computer-assisted Search and Rescue

by LTjg Nancy H. Ross
Chief of Maritime Relations
Atlantic Area Information Systems Division

Two computers cannot physically provide aid to mariners in distress around the world. They can, however, store and allow operators to retrieve the information which makes such assistance possible. AMVER, the Coast Guard's Automated Mutual-assistance VEssel Rescue system, is set up for expressly that purpose. Ships of more than 80 nations voluntarily participate in AMVER by sending their sail plans, periodic position reports, and such information as whether they have a doctor on board to the AMVER Center on Governors Island, New York. By predicting the positions of merchant vessels near the scene of an emergency, AMVER can help rescue agencies determine which vessels are best able to assist. In addition, should a participating ship need assistance, rescuers can more easily determine a search area based on AMVER information. Ships' positions are divulged only to authorized rescue agencies for use in an emergency. There is no cost for participating in the system, and nearly 100 cooperating radio stations send the ships' reports to New York free of charge. More than 2,200 vessels are on plot on any given day.

To centralize its computer operations, the Coast Guard is presently refurbishing the AMVER Center on Governors Island and creating an Operations Computer Center. The two computers mentioned above are the heart of this facility, which is administered by the Atlantic Area Information Systems Division.

The two Prime 750 mini-computers were purchased in January 1980. They were installed the following April after the AMVER Center was remodeled slightly to accommodate them. The complete renovation of the center was begun in July 1981 and is scheduled for completion later this year.

The changes underway at AMVER are only the latest in a series that has gradually broadened and improved AMVER's capabilities. AMVER began in 1958 as a hand-calculated plot of vessels in the Coast Guard's Atlantic Ocean area of search-and-rescue responsibility. The plotting was computerized that same year, and in 1960 the area covered was extended to longitude 15 W, still in the North Atlantic.

AMVER was expanded to the Prime Meridian in 1963 and to the North Sea, Mediterranean Sea, and South Atlantic in 1964. The Pacific Ocean was included in 1965 after the purchase of a new computer. At present, the system relies on the Department of Transportation Computer Center in Washington, DC, to which data is transmitted by phone line from New York. After its completion, the new center on Governors Island will become the focal point of computer support for both AMVER and other Coast Guard operations.

The missions of the new Operations Computer Center (OCC) will include several additional marine and port safety functions. Among these is maintaining data for the extensive

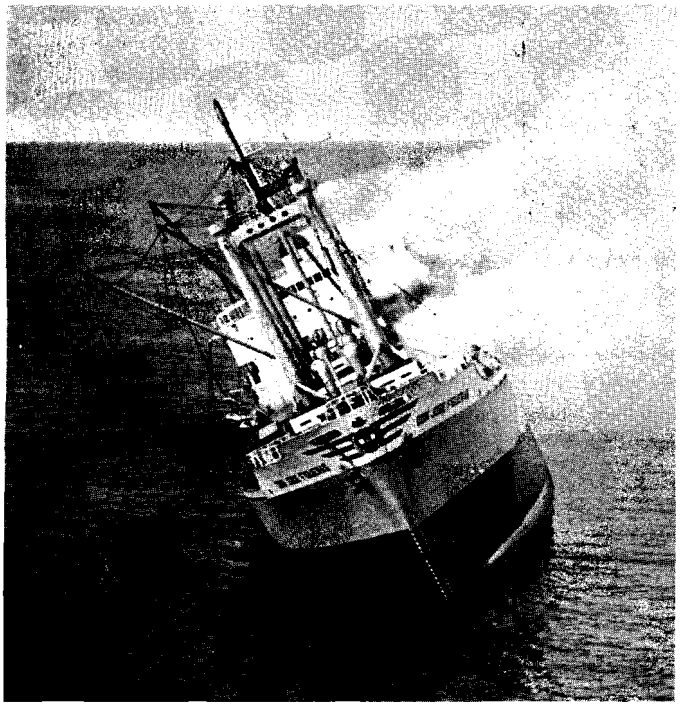
Marine Safety Information System (MSIS). Two Prime computers now in Ohio for development of MSIS are scheduled to be moved to Governors Island to handle that system exclusively.

Although the various missions will all come under the OCC's umbrella, not all users will have access to all data. For example, stringent measures will ensure that AMVER data remains available only to search and rescue agencies.

The OCC will coordinate data that applies to more than one Coast Guard mission. This will eliminate duplication in the collection and dissemination of data related to the same incident—for example, a collision between two ships that makes a rescue operation necessary and also pollutes the waterway. The goal of the system is to provide better computer support for all missions of the OCC.

Each of the Prime computers has a storage capacity of several hundred million characters, or bytes. In both storage capacity and computing speed, the Primes exceed the Department of Transportation computer now used by AMVER. The larger capacity will enable operators to plot a greater number of vessels and do a more sophisticated analysis of search planning problems. The increased computing speed will enable them to more rapidly retrieve AMVER information in an emergency.

The Information Systems Division's programmers have been testing and learning about the new computers since installation of the equipment in 1980. Data and programs are gradually being transferred from the Department of Transportation computer to the OCC. The transfer is scheduled for completion by July 1982. Last year the plotting of icebergs for the International Ice Patrol (a task assumed by the Division in 1970) was done on the Primes after the data was converted from the form used in the Department of Transportation computer.



AMVER's goal is to help rescue agencies see that those vessels best able to assist come to the aid of vessels in trouble.

A network of terminals linking Coast Guard District rescue coordination centers to the computers has been established, and all Districts except two have rented one or two terminals. Eventually standard terminals will be purchased and installed throughout the service at many commands.

Unlike the present cumbersome communications link, which relies heavily on teletypes for the transmission of data, the terminals allow users to "converse" with the computer by entering various commands on the terminal's keyboard. The computer's replies are displayed on the terminal's video screen almost immediately.

A printer may be used in conjunction with the terminal to print out information to be retained. This will eventually include graphic AMVER "surface pictures," chart overlays showing the predicted positions of participating ships. The "surface pictures" produced by the present system are actually lists of ships and their positions.

The new system will also allow operators to enter AMVER messages directly into the computer without rewriting them, as they must under the old system. A new format for the messages will be devised to make use of this capacity. Every effort is being made to design a format that can be easily read by both the ship's officers and the computer.

In January 1980 more than 40 representatives from Coast Guard Headquarters and 11 of the 12 Districts came to Governors Island to learn how to use the terminals and programs. Those who attended the five-day session in the AMVER Center theater learned how to work with some of the computer's available languages, how to write simple programs, and how to use INFO, a sophisticated computerized filing and retrieval system purchased for the Primes. INFO allows rapid access to the computers' data.

Students who attended the course are now able to write programs for local application. Those that have been written so far include the

The computers' data is stored in disk packs.

The operator loads a magnetic tape onto one of the two Prime computers. Tapes can be used to transfer data from one computer to another or to store data no longer needed on the disk pack.

updating of the Third District's aids to navigation records, inventory control for scientific equipment aboard ships in the Pacific Area, the maintaining of fixed-gear fishing records in the Atlantic Area, and operational cost computations in the Fifth District.

When completed, the new Operations Computer Center will both improve AMVER and enable the Coast Guard's Atlantic Area Information Sytems Division to better carry out its other missions. The Coast Guard's computer operations are being centralized;the assistance made possible by those operations will continue to extend worldwide. ⚓

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Nautical Queries

The following items are examples of questions included in the Third Mate through Master examinations and the Third Assistant Engineer through Chief Engineer examinations.

DECK

1. Serving is

A. marline or ratline wound along the grooves of a rope.
B. narrow strips of light canvas or cotton cloth spiral-wrapped along the rope.
C. marline tightly wound on the rope by means of a board.
D. a splice made by laying the strands of one rope in the vacated grooves of another rope.

REFERENCE: Knights

2. In areas where CO_2 piping is installed, such piping may not be used for any purpose except

A. in connection with the fire-detecting system.
B. in connection with the water sprinkler system.
C. to ventilate the space.
D. to run the emergency wiring to the space.

REFERENCE: 46 CFR 95.15-15(h)

3. A Loran-C receiver in operation first receives pulses from the

A. slave station.
B. master station.
C. multiple stations.
D. secondary station.

REFERENCE: Dutton's

4. What type of cargo venting is permitted on a tanker which carries Grade B petroleum products?

I. Branch vent lines from each cargo tank connected to a vent header
II. Individual pressure-vacuum relief valves at each cargo tank
III. Gooseneck vents and flame screens at each cargo tank

A. I and II only
B. I and III only
C. II and III only
D. I, II, and III

REFERENCE: 46 CFR 32.55-20

5. Lighted ranges located along a navigable channel may be used to mark

A. shoals and obstructions in a channel.
B. turning points in a channel.
C. anchorages in a channel.
D. restricted areas in a channel.

REFERENCE: Dutton's

ENGINEER

1. The solenoid valves in the fuel supply line of an automatically-fired auxiliary boiler are automatically closed by

A. a decrease in feed temperature.
B. high furnace air pressure.
C. high steam pressure.
D. low steam pressure.

REFERENCE: 46 CFR 63.05-30.10-30

2. Where two-stage air ejectors are used in a two-stage flash evaporator, the first-stage air ejector takes suction from the second effect of the evaporator, and the second-stage air ejector

A. takes suction from the first effect.
B. takes suction from the second effect also.
C. takes suction from the first-stage air ejector outlet.
D. is normally idle and used mainly as a standby unit.

REFERENCE: Harrington

3. A relatively constant pressure is maintained in the potable water system of many ships by using

A. constant speed supply pumps.
B. variable speed supply pumps.
C. an air cushion in the pressure tanks.
D. a pressure regulator in the pressure tank discharge piping.

REFERENCE: M.E.B.A. Training Manual

4. The breathing bag of a canister-type oxygen breathing apparatus is used to store

A. exhaled CO_2 until the canister chemicals can begin the oxygen-making process.
B. generated oxygen, which is created faster than the wearer can use it.
C. generated oxygen, accumulated so that the wearer may replace cartridges without leaving the space.
D. exhaled CO_2 which has been separated from the exhaled moisture by the cartridge chemicals.

REFERENCE: Marine Fire Prevention, Fire-fighting and Fire-safety

5. What poisonous gas is most likely to be found in a closed compartment that is on fire?

A. Nitrogen
B. Hydrogen
C. Carbon dioxide
d. Carbon monoxide

REFERENCE: Marine Fire Prevention, Fire-fighting and Fire-safety

ANSWERS

DECK
1.C;2.A;3.B;4.A;5.B
ENGINEER
1.C;2.C;3.C;4.B;5.D

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