PROCEEDINGS
OF THE MARINE SAFETY COUNCIL

DEPARTMENT OF TRANSPORTATION UNITED STATES COAST GUARD

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IN THIS ISSUE . . .

Two Views of the Future of Satellite Communications in the Marine Industry . . .

Specimen Exam Questions from Towboat Operator Examination . . .

THIS COPY FOR NOT LESS THAN 20 READERS—PLEASE PASS IT ALONG

CONTENTS

COVERS

FRONT COVER: On this cover is pictured the SS *Oregon Mail,* the recently jumboized C6 containership. She was placed in service between the Pacific Northwest and Japan last fall.

BACK COVER: The inferno that ensued after the SS *C. V. Sea Witch* and the SS *Esso Brussels* collided near the entrance to New York harbor is shown in this dramatic photo taken by Jeff Blinn of Moran Towing. Readers should see the important item on page 170 of this issue. *Photo courtesy Jeff Blinn, Moran Towing.*

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PROCEEDINGS

OF THE

MARINE SAFETY COUNCIL

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IMCO ACTIVITY IN MARITIME SATELLITES

By Lt. Cdr. Robert E. Fenton, U.S. Coast Guard

ED. NOTE: The following article is adapted from a paper delivered before the Assembly Meeting of the Radio Technical Commission for Marine Services, Seattle, WA., April, 1973.

Introduction

THE SUBJECT of maritime satellites is not new to the Radio Technical Commission for Marine Services (RTCM), its Assembly Meetings having provided a most useful forum for interchange of technical information in this burgeoning field over the past several years. What has changed is the increased sense of anticipation in the maritime community. As a result of the frequency allocations made at the 1971 World Administrative Radio Conference for Space Telecommunications (WARC–ST), the extensive research programs being funded within the United States and abroad, and most importantly, the urgent user needs, it now appears that operational maritime satellite systems will soon be a reality. The impetus for this development on an international basis has been the Inter-Governmental Maritime Consultative Organization (IMCO), whose Panel of Experts on Maritime Satellites is now intensively studying the implementation of such a system by 1978. The purpose of this article is to outline the history of IMCO activity in maritime satellites, to describe the work that has already proceeded in the Panel, and to extrapolate this to a speculative characterization of a first-phase maritime satellite system.

The Panel of Experts on Maritime Satellites

Our readers are familiar by now with the origin and the general organization of IMCO (*see Proceedings*, November 1972.) The Sub-Committee on Radiocommunications, one of twelve standing Subcommittees under IMCO's Maritime Safety Committee, is concerned with the application of radio to the safety of life at sea, and it is under its auspices that the Panel of Experts on Maritime Satellites has been established. The Panel was instituted by the Maritime Safety Committee early in 1972 as a subsidiary body of the Radiocommunications Sub-Committee, recognizing the urgent need for a maritime satellite telecommunications system and the work that had been previously accomplished by the Sub-Committee in analyzing satellite applications to world shipping. This had included a 1970 statement by IMCO of operational requirements for satellite services, which was used extensively in the preparations for the 1971 WARC–ST and which was of material assistance in obtaining frequency allocations for maritime satellite development and deployment. Additionally, concurrent with its study of the maritime distress system, the Sub-Committee had developed a useful data base on the technical aspects and utility of satellites in enhancing maritime safety.

The Panel was intended to amplify and intensify these studies, serving as a catalytic agent for international action culminating in the acquisition in 1978 of an operational maritime satellite capability. Its terms of reference are as follows:

1. Study the operational requirements of a maritime mobile satellite system.

2. Study the essential characteristics of a satellite system.

3. Study the critical system elements; for example, ship terminal.

4. Prepare cost/benefit and marketing studies leading to a cost evaluation.

5. Consider and make recommendations for a program of experiments and development work.

6. Prepare a report for the first meeting of a proposed international conference in 1975.

The Panel hopes to complete its work in 1975. At that time, it is planned that an international conference would prepare and ratify an agreement providing for international support of the new system. An organization, as yet unspecified, may be formed to prepare final system specifications and to settle the details of system operation and maintenance. Assuming favorable progress in technical and administrative problems, operational availability would commence in 1978. Overall, the timetable for implementation represents an ambitious work program, but at the same time is an apt commentary on the degree of urgency with which the maritime interests view the emergence of satellite technology.

Operational Requirements

The original motivation for satellites, as reflected in the 1970 IMCO statement, was their possible use in the maritime distress system. It was felt that the present system was inadequate because of its exclusive dependence on terrestrial communications, which cannot provide suitable links at all times. However, it soon became apparent that this was only one manifestation of the larger problem of maritime communications, which is characterized by poor reliability, long message delays (5–6 hours average) and use of obsolescent methods. Accordingly, first priority has been assigned to the development

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of maritime satellite "public correspondence" communications to provide the ship and its owner with high-quality voice and data circuits. This priority has been reinforced by the increasing congestion being experienced in the HF maritime bands, and the limitations of that medium in providing new services such as wide-band data, etc. Fortuitously, the public correspondence and safety categories form a symbiotic relationship of sorts; a satellite system designed primarily for commercial traffic can be very efficient for safety and distress, with little increased cost but with considerable benefits to the maritime community.

Satellite navigation and surveillance have not received much support within IMCO. To a certain extent, this reflects a degree of satisfaction with current systems such as OMEGA, TRANSIT, LORAN and DECCA. Possibly more important, though, are the subliminal fears on the part of the user community that institution of such a system would invariably involve some form of user charges; at the same time, many Administrations feel that the cost of a second satellite in each oceanic region will make the total system noneconomic. The concensus which apparently has crystallized is that the first phase maritime satellite system should not preclude the eventual addition of radiodetermination facilities, but that the public correspondence function will largely determine the system design. Parenthetically, it should be noted that there is considerable interest in both the Union of Soviet Socialist Republics and the United States for at least a minimal navigation capability.

The latest IMCO view is outlined in document MARSAT ES.1/WP 1 of November 1972. Table I summarizes the salient points of that paper.

Performance Characteristics and Critical System Elements

At the meetings of the Panel, the usual practice has been to establish a Technical Working Group to prepare draft material relating to performance requirements and technical characteristics. This group has concentrated on the first-phase system, and has drawn heavily on reports previously prepared for the Internatinoal Radio Consultative Committee (CCIR) and others. Each system element (ship terminal, satellite and earth station) has been considered.

Agreement has been reached on the type of orbit (geosynchronous) and coverage areas desired (all sea areas up to 70° N and to 70° S for 24 hours; polar regions as possible). If there is a priority to be assigned, it is likely that the Atlantic basin from the U.S. East Coast to the Persian Gulf would be considered most important.

At its next session in London (30 April–4 May 1973), the Panel hopes to complete a listing of the overall technical parameters of an optimal system and its interface with the international telecommunications networks. These will, no doubt, be reviewed carefully prior to the final system definition, and many of the unknowns or unresolved issues will he defined.

Table II presents information on the expected technical characteristics of a first-phase maritime satellite system.

Cost/Benefit Studies

IMCO has not examined this subject in depth, but has received the results of several independent studies conducted within individual Administrations. It is expected that the September 1973 meeting of the Panel will concentrate on an economic assessment of the system in preparation for the proposed Conference of Governments in 1975.

Those studies that have been accomplished form a useful basis for evaluation. However, each has approached the overall system with a different baseline, and therefore it is difficult to make comparisons between studies. Many of the parameters that impact on system cost and benefits have not been completely defined, such as ship antenna gain, satellite power per channel, number of ground stations, and system reliability. Additionally, of course, the size of the user population and its demand for telecommunications services are only speculative forecasts at this time.

The Maritime Administration looked at the total use of satellites to improve the economics of marine transportation. It developed a revenue benefit based on the application of a single percentage point "benefit factor" through actual comparison to historical cost and revenue experience. Assuming this can be achieved, a pessimistic cost benefit per ship per year of $117,000 was forecast, with a corresponding optimum yearly benefit of $468,000.

Other investigators have approached the problem purely from the public correspondence viewpoint; i.e., the costs of operating a satellite system without reference to its projected

TABLE I.
MARITIME SATELLITE OPERATIONAL REQUIREMENTS

a. Size of participation	Initially, larger vessels with high traffic loads. Estimate—4,500 ships in 1980.
b. Numbers of channels	Not agreed. To be based on traffic statistics and/or on satellite capability.
c. Types of services	Telephony: 1. Public correspondence 2. Ship operations 3. Distress 4. hybrid—quality dependent on direction of transmission. Data. Facsimile. Radiodetermination—undecided, but not precluded.
d. Coverage	70° N. to 70° S.—24 hrs. Polar regions—as possible.
e. Connectivity	Should be capable of direct through-dialing to the international telephone network.

benefits. A recent COMSAT paper presented curves for two values of ship traffic per year (500 and 5000 minutes) and two voice qualities (marginal and good). In this study, a good quality voice circuit through a 10 db antenna would cost approximately $8 per minute. Another study, using a different baseline, arrived at an economic cost of $9 per minute when a ship antenna gain of 9–13 db is assumed with 1000 watts DC power available from the satellite. Although these two examples show close agreement, the cost per minute can assume almost any value, depending principally on the selection of antenna gains, satellite power, voice quality required, and actual traffic loading.

Overall, there appears to be a good basis for optimism concerning the costs of maritime satellite system. The benefits are not easily quantifiable, but should become clearer as operational experience is gained with the system and as the shipping community learns the many uses to which reliable communications can be put.

TABLE II. POSSIBLE SYSTEM CHARACTERISTICS

a. Orbit	Geosynchronous with low-inclination (±5° or less)
b. Launcher capacity	300–400 Kg per spacecraft.
c. Modulation	Voice: 1. Private-call quality—high quality: a. Narrow-Band Frequency Modulation (NBFM). b. Continuously Variable Slope Delta Modulation (CVSD). 2. Service-call quality—high intelligibility: a. Adaptive NBFM b. Phase Delta Modulation (PDM) c. Quadrature Modulation d. Delta Modulation (DM) e. Transmit Control Techniques. Data: 1. Phase Shift Keying (PSK) 2. Frequency Shift Keying (FSK). Ranging: 1. Side-tone ranging 2. Pseudo-noise-code ranging.
d. Access delays	1. Public correspondence—15 minutes for 99% of the time 2. Distress and SAR—2 minutes for 99% of the time (not yet agreed).
e. System availability	Dependent on service required. 90%, 95% and 99% of the time of the worst expected one-hour period. User input required.
f. Ship antenna gain	Two types: 1. 10–25 db for public correspondence. 2. 0–4 db for distress, low-speed data, radiodetermination.
g. accessing	FDMA probable in both directions.

Organizational Arrangements

Although there has been widespread agreement within IMCO concerning the need for and utility of a maritime satellite system, there has naturally been a diversity of approaches advocated for the implementation of such a system. To some degree, this dichotomy of views represents a fundamental philosophical difference between European and American concepts of system ownership and operation. On a larger basis, though, it is a manifestation of the real problems which may be encountered in establishing international satellite systems without adequate precedents for resolution of the important economic and managerial aspects.

The basis for discussion of organizational arrangements within IMCO has been a document submitted by the Soviet Union to the first Extraordinary session of the Panel in November 1972. (Provisional Principles for the Establishment of an International Organization for a Maritime Satellite Service). It was prepared as a "base-line" approach for the proposed International Conference of Governments in 1974–75, which is intended to adopt among other things an agreement on the establishment of an international organization for a maritime satellite service. In concept, it favors a new International organization with a structure similar to IMCO (Assembly, Council and a permanent Directorate), with full powers to finance, establish and operate a maritime satellite system.

Most countries have viewed the USSR paper as an important contribution to an assessment of organizational arrangements. With the exception of the United States, all have endorsed the need for an international conference to resolve the points of issue. There is not a clear indication as to whether the majority of Administrations believe that a new organization is required. Opinions on this point range from the new full-scale organization as proposed by the USSR to the limited use of existing international organizations as proposed by other Administrations.

The United States, while firmly supporting the need for a speedy deployment of a maritime satellite capability, has consistently believed that not enough is yet known of system requirements to effectively consider organizational arrangements, and that it was desirable for all Administrations to refrain from establishing prematurely a world organization that could later prove not responsive to maritime needs. It advocated the establishment of an enlarged Maritime Satellite Committee in IMCO to review the broad range of issues. Ultimately, this Committee would be responsible for recommending the most suitable organizational arrangements, consistent with maritime needs and economy.

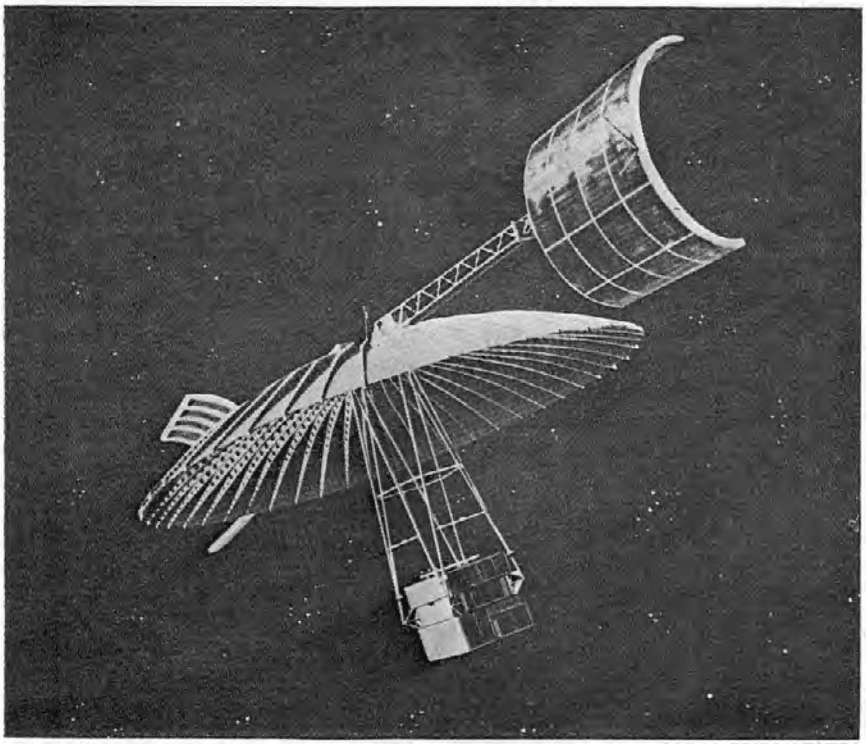
At this time, there is not an agreed IMCO position on organizational arrangements. Although the Panel will attempt to develop a recommendation for the 1974–75 Conference at its April 1973 session, it seems probable that it will take quite some time to resolve the multitude of questions involved in organizational arrangements.

Proposed COMSAT Maritime Satellite System

Apart from the work being pursued within IMCO, the Communications Satellite Corporation (COMSAT), through its wholly-owned subsidiary COMSAT General Corporation, has filed with the Federal Communications Commission an application for authorization to construct and operate a communications satellite system to provide communications services to the U.S. Navy and to commercial fleet operators. The Navy portion, popularly referred to as GAPSATCOM, is intended to provide a two-ocean UHF (225–400 MHz) tactical communications capability to its operating forces during the time between failure of the LES–6 and TACSAT satellites and the deployment of the Fleet Satellite Communications System (FLTSATCOM), slated for mid-1976. Upon its launch in September 1974, the system is expected to provide a broad band (500 KHz) UHF channel and two 25 KHz channels, if requested by the Navy, for a period of 2–3 years. Since an improved Delta launch vehicle is being used with a modified Hughes Telesat Satellite, similar to that used in the Canadian domestic system, excess capacity would be available and is being used for L-Band maritime services. During the first few years, the Navy use will absorb most of the spacecraft power; in the last few years of the five year design life-time, the entire satellite power can be switched to the L/C band repeaters. Operating with sub-satellite points at 15° W and 176.5° E longitude, the Atlantic and Pacific Oceans will be served by new earth stations to be located in Southbury, Connecticut, and Santa Paula, California. Two types of ship antennas are tentatively planned for installation, which may be provided by COMSAT on a lease basis after a design competition within industry. The first is to be used for voice and high speed data, having a nominal gain of 20db, a physical diameter of 3′, minimum EIRP of 36 dBW and a receive sensitivity of −7 db/°K. The second will provide low speed data service (50–100 wpm teletype) through a hemispherical coverage antenna with 16 dBW EIRP and a sensitivity of −27 dB/°K.

COMSAT has concluded that the service can be marketed to an average of 400–600 ships over the five year lifetime, and expects to generate an average annual revenue per ship of $24,000 throughout the five year period 1974–1979. The combined revenues from the Navy and L/C band maritime services appear sufficient to enable it to recover its $70M space segment investment, as well as a good opportunity of achieving a profit.

In making its proposal for maritime satellite service, COMSAT has noted its belief that deployment of its system is not intended to prejudice the long term organizational arrangements and growth of maritime satellite services. It believes that this first system will provide an important service in an early time frame, and concurrently permit an opportunity for experimentation of new concepts and techniques with possible eventual application in a long-range maritime satellite system.



An artist's rendering of NASA's advanced ATS–F satellite similar to one planned for a maritime satellite system. *Courtesy U.S. National Aeronautics and Space Administration.*

Conclusions

Although many details remain to be resolved, the interest and pace of activity in maritime satellites make academic the issue of whether such a system will be deployed. For the foreseeable future, the international center of action will remain within IMCO through its Panel of Experts. Through this unique maritime forum it is hoped that reasonable cost effective solutions can be developed for the myriad problems now plaguing maritime telecommunications. The progress that has already been made in a relatively short time gives abundant reasons for optimism.

SPEED COMMUNICATION

By Larry C. Manning

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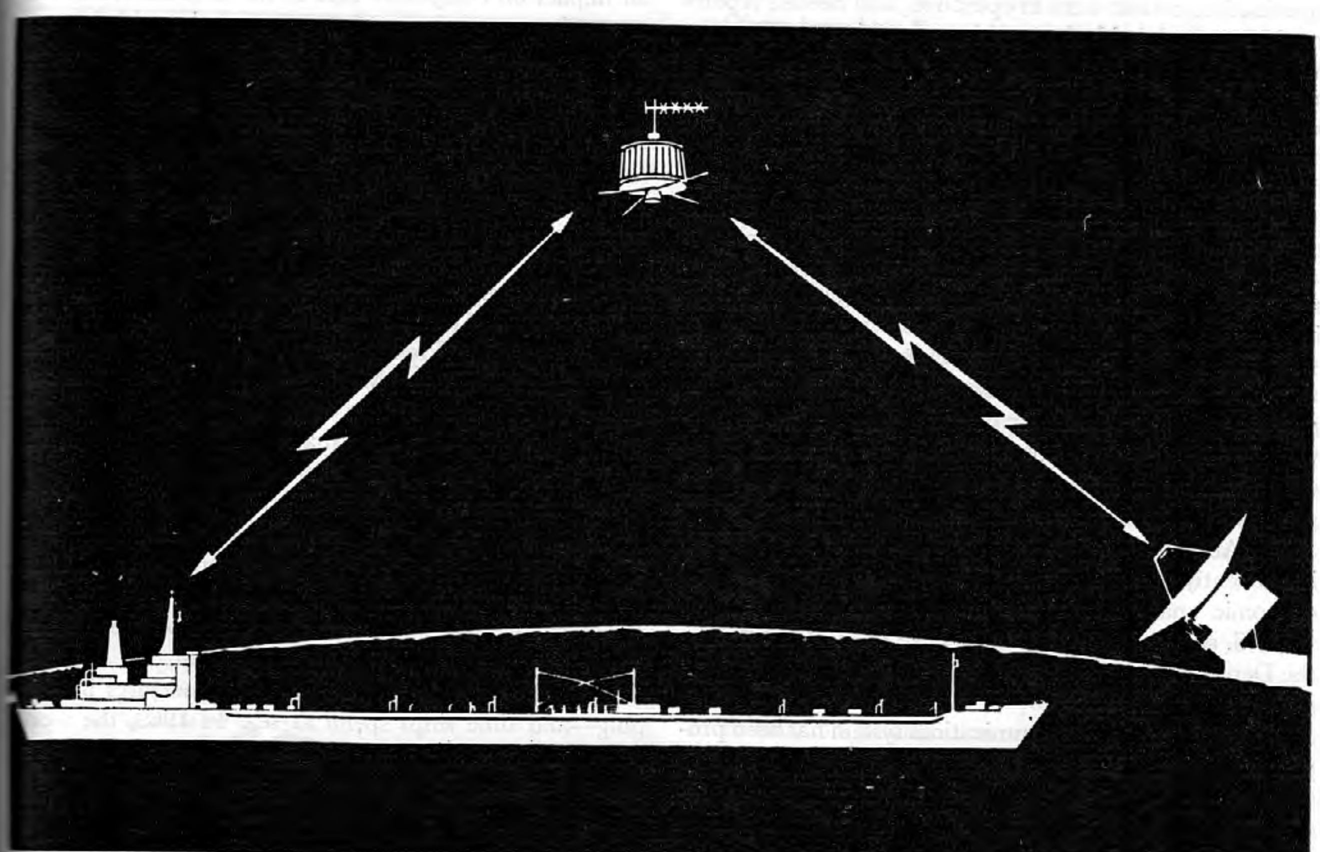
IN EACH OF man's journeys to the moon, through hundreds of thousands of miles of space, U.S. astronauts seldom have been out of touch with Earth. Television pictures beamed to Earth have been seen on millions of TV sets—while the astronauts described in living color what they saw and their reactions to it.

And yet, those who sail the Earth's seas in ships still depend upon messages sent and received in Morse code, a system developed in 1838, at a rate far below man's normal speaking speed of 120 words a minute.

Lack of modern maritime communications is especially significant when one considers the fact that ships carry 98 per cent of the world's products, by volume. By value, they move 93 per cent. Compare maritime communications with those existing in the air industry—which enable air controllers to contact aircraft worldwide in minutes—and one wonders if the maritime industry is not missing a bet.

In a report to the American Institute of Merchant Shipping, Edward P. Fitzgerald, an Exxon official, indicated just that. "Never," he said, "has there been a time that a technology has so far advanced beyond the implementation of its capabilities by the maritime industry."

Need for more effective communications between ships, and ship to shore is evident. In the past two years, at least five large commercial vessels have gone to the bottom without successfully sending a distress message. In each case, at least 20 lives were lost.



Ship explosions, fire or breaking up generally result in loss of power which accounts for inability to send a distress signal. Other reasons include equipment failure, or improper operation of equipment because of seamen's lack of familiarity with it.

In November 1966, the SS *Daniel J. Morrell* sank on Lake Huron at 2 a.m. More than a day and a half later a search was started for the ship. Lack of communications caused the delay since it was not known the ship was missing for 36 hours. Despite the fact that two ships were in the immediate area, 28 men died. Only one survived.

In another instance, a burning Norwegian vessel was sighted off Greenland by a Polish ship which could not communicate with the blazing vessel by either voice or radio. When a U.S. Coast Guard vessel arrived on the scene, three men still on the ship were saved, and four bodies were recovered. Another 25 had abandoned ship. They never were found, despite a two week search.

Many other examples could be listed, all of which dramatically point up the need for better communications. Other factors also are involved.

Crew morale is one. With better communications, crewmen could be more promptly notified of family emergencies. Same goes for emergencies aboard ship which require medical assistance or guidance. Vessel movements and diversions could be better controlled if a rapid communications system were in operation, and needed repairs could be scheduled before a ship arrived in port. Current weather forecasts would help save lives and damage, and transmission of up-to-date information would enable fleet owners to make more intelligent and cost-saving decisions which are required every day.

It's probably an exaggeration, but not too great a one, to state that hundreds of lives lost and millions of dollars squandered could have been saved if the maritime industry had made the investment required to develop marine communications systems comparable to those existing in other transportation fields.

But something is being done. Unfortunately, much of the effort takes the form of studies. And studies, as any student of human endeavor can tell you, share a characteristic with the angleworm. Divided into several parts, they continue to exist and proliferate. Studies too often generate bucketsfull of worms—and few solutions.

The American Institute of Merchant Shipping (AIMS) has recently completed one technological assessment and economic analysis of a satellite communications system for U.S. shipping. Other studies have been conducted by the Department of Commerce's Maritime Administration and by the Coast Guard.

A satellite marine communications system has been proposed which would harness techniques mastered in space flight and research—and which would provide a communication blanket for the Atlantic, Pacific and Indian oceans. Ship distribution is estimated at 35 per cent in the Atlantic and in the Pacific and 25 per cent in the Indian ocean—95 per cent of total ship traffic.

The U.S. Navy is a stride ahead of the merchant marine in efforts to provide 20th century communications for ships, with a Global Rescue Alarm Net already being developed. Compact and simple transmitters will link Navy ships with space satellites which can relay messages literally around the world, instantaneously.

Obviously, Navy ships spend substantial time at sea. In the past merchant ships spent much time in port, loading and unloading. However, with development of new types of cargo vessels and tankers, merchant ships now spend as much as 65 per cent of their time at sea. That aggravates the communications problem. Out of sight and out of reach, ships are more or less going it alone when effective utilization of intermodal transportation systems demands timely communication among all elements of the system.

Consider today's $20 to $65 million investment in a single ship, and one again must wonder why so little money has been spent to improve communications.

According to Gerard P. Yoest, who is coordinating AIMS push for adoption of a navigation-communications system using space communications satellites, "A European consortium could well develop the first marine satellite system." "That would have," he warned "a detrimental impact on competitiveness of the U.S. merchant marine, and on our balance of payments and worldwide economic position."

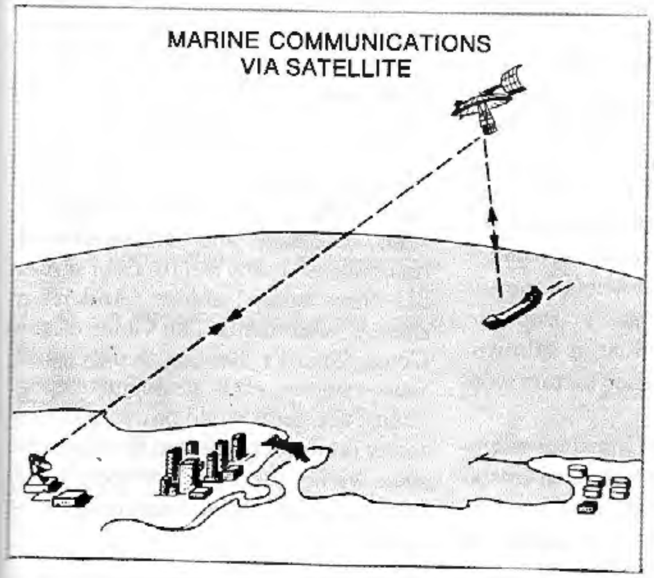
"European nations possess the ability to launch a maritime communications satellite," he added, "and so do the Japanese." He also reported that the USSR is interested in the Inter-Governmental Maritime Consultative Organization's (IMCO) satellite planning—and would probably support development of a satellite communications system.

At present eight American companies are working with the Maritime Administration in a test program. They include American President Lines, Chevron Shipping Co., Exxon, Farrell Lines, Marine Transport Lines, Moore McCormack Lines, Texaco Inc., and United States Lines. Focus is on obtaining data that would enable a compilation of requirements for an operational system.

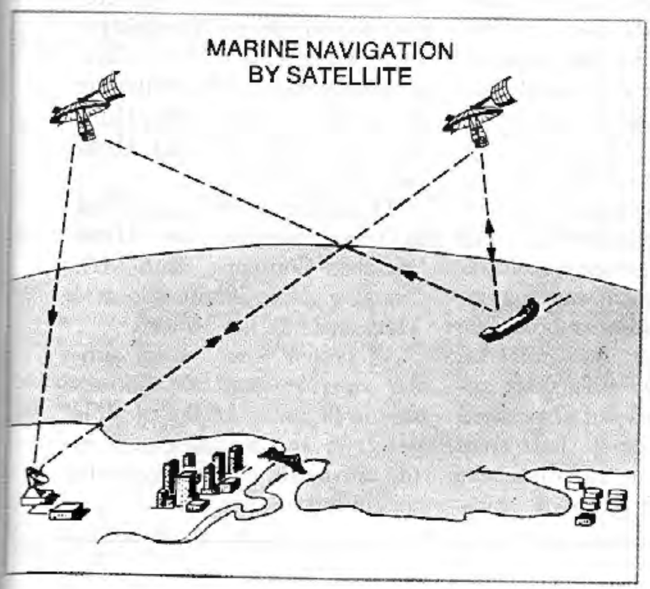
In a survey of 12 large shipping companies, AIMS asked if they would use satellite navigation services, if they would use satellite surveillance activities, and if the ship masters would welcome such services. Sixty per cent answered yes to the first question with positive response to the other two queries being 100 per cent.

The AIMS study also reported on increases in shipping—and time ships spend at sea. In 1969, the world fleet consisted of more than 21,000 ships, with 10,000 at sea at any one time. Projections for 1980 indicate there will be 25,000 ships with almost 14,000 at sea at a given time. Growth of the sea population will be about 40 per cent although numbers of ships are projected to be up only 18 percent. What does that indicate? That communications will become even more important.

At eight words a minute, 1970 telegraphic transmissions required about 125,000 man hours a month. Projection for 1980 is 380,000 hours, up 200 per cent. Number of radiotelephone calls in domestic high seas will jump from 104,000 in 1970 to 418,000 by 1980, an expansion rate of 30 per cent per year. Theme of the day then may be, "That line is busy."



Two of the possible uses of satellite communication in the maritime world. Faster, more efficient communication could also make the maritime world safer.



Even now delays are commonplace. Mail deliveries to ships require weeks with radio-telegraph transmission time averaging 12 hours. While mail delivery is reliable, radio-telegraph reliability is labeled "poor." So is that for radio teletype, radio telephone, facsimile transmissions and data and emergency messages. And cost is high—or at least higher than satellite costs are predicted to be.

Median cost for radio telegraph messages is about 38 cents per word with radio teletype costing 6 cents per word. Radio telephone? Deposit $6 for three minutes, please.

Present systems have other limitations. Transmitter frequencies are severely limited with telephone transmitter power inadequate—which means short range capability. Data and facsimile capability are similarly inadequate. Another disadvantage of existing systems is that no meaningful standards have been set for design of reliable equipment or its operation.

Equipment reliability is 70 per cent, accordingly to an 1967–69 IMCO study with propagation reliability only 80 per cent. All of which reminds one of the Vermont farmer who told a tourist seeking directions, "You can't get there from here."

What type of communications service is needed? According to AIMS, rapid access and high reliability for voice, facsimile, teletype and data communications. That means average delay of no more than 10 minutes and 99 per cent reliability. Only automated methods of contact should be used, AIMS reports, and an effective system must be interconnected with the general telecommunication networks. They recommend leased systems with standard charges, and refunds to the user for time equipment is not operational.

The obvious question is, cost? AIMS studies indicate that satellite communications would cost 3 cents a word—considerably less than the present 38 cents. That figure is based upon an assumption that 1,500 ships in the Atlantic, Pacific and Indian oceans would use the satellite system. A relatively small sum of $6,000 a year would handle the leasing of all shipboard and space hookup systems. And that estimate includes the maintenance of shipboard systems.

Present costs, according to an operator of 150 ships, are $6000 per year for a ship, plus $4000 for maintenance. Apparent savings of $4000 a year would he boosted even more since no amortization would be required for leased shipboard equipment.

Will ship communications ever be linked to satellites? Two March events pretty much tell the story. At a meeting

(Continued on page 173)

BOTTOM'S UP

CAPSIZINGS AND falls overboard account for the majority of recreational boating deaths in this country. In 1972, for example, 574 fatalities were attributed to capsizings and 337 resulted from falls overboard.

Contributing to small craft capsizings are such unsafe practices as excessive speed, overloading, improper loading, and disregard for adverse weather conditions. In the instances of falls overboard, improper loading is the primary cause, though equipment failures occasionally are responsible.

The following true stories are drawn from among the accident reports on file at the Coast Guard's Office of Boating Safety. Each narrative illustrates why the Coast Guard is so concerned about the large number of accidents that involve capsizings or falls overboard.

Boat Upside-down, Causes One Man to Drown

Four persons aboard a 10-foot outboard (rated with a load capacity of 350 pounds) were victims of a tragic capsizing in which one man lost his life.

The operator, a guest couple and their small child were out on the New River near Meadow Creek, W. Va. But they weren't out for long. Shortly after getting underway, the overloaded boat began to ship water and soon capsized. The operator swam to shore; the woman guest remained with the boat and was able to keep herself and her child afloat until they were rescued downriver some time later; the husband, a non-swimmer, drowned.

For his failure to equip the boat with personal flotation devices, and for overloading the boat, the operator was charged with negligent operation.

Rough ride. . . . over the side

A father and son were enjoying a fishing trip on Narragansett Bay in Rhode Island. The two were aboard their 16-foot fiberglass boat which was powered by a 65 horsepower motor. As the day wore on, the weather conditions deteriorated. Finally, the father decided it was time to head back to shore. With the son at the controls, the boat was homebound at speeds of up to 25 knots; however, it was a difficult journey as the small boat was tossed by five-foot seas and buffeted by 30-knot winds. Suddenly, a steering cable clamp broke and the vessel swerved to the right. The father, standing in the stern of the boat, lost his balance and fell overboard, whereupon he was struck by the boat's propeller. The fatality is listed as a "drowning," but so many other factors were responsible.

Subsequent Coast Guard investigations revealed that a chemical breakdown had damaged the metallic steering cable clamp, providing the initial cause of the accident. However, neither the father nor son had bothered to obtain a weather forecast before setting out. Also, it was poor judgment on the part of the son to operate the boat at high speeds in the rough waters. The father used poor judgment by standing in the stern of the boat, and his failure to wear a personal flotation device should be noted. Though he was hit by the propeller, he died not from the wound but from drowning.

The Coast Guard has been maintaining boating accident records since 1960; over the past thirteen years, capsizings and falls overboard have yielded many hundreds of stories like those related above. "And it's a shame," comments The Chief of the Coast Guard's Boating Safety staff who reviews each accident report. "Most accidents could be avoided and many fatalities prevented if only boatmen would use their common sense and practice safe boating procedures."

Coast Guard Reaches Tentative Conclusion on Collision

On June 2, 1973 the SS *C.V. Sea Witch* and the SS *Esso Brussels* collided near the New York Harbor. Although the Marine Board of Investigation which was convened has not completed its investigation, it has tentatively concluded that there was a loss of steering on board the SS *C.V. Sea Witch* which was caused by failure of the universal coupling connection in the shaft between the Sperry steering engine room receiver unit and the steering engine differential gear box. The key connecting the universal coupling to the stub shaft apparently slipped out of position allowing the input shaft from the Sperry unit to rotate the coupling shaft without transmitting rotation to the differential gear box.

The steering gear involved has been identified as Hyde Windlass Company steering gear for Maritime Administration design C5-5-73 B, Containership for American Export Isbrandtsen Lines B1W Hulls Nos. 354, 355, 356, MA Hulls Nos. 205, 206, 207.

The differential is identified as manufactured by Hyde Windlass Company, Bath ME. Drawing No. 20560, Control Mechanism BOM 310041.

All vessels with this or similar steering gear installations should be aware of the possible defect in keys and key ways in the universals, connecting shaft, and differential gear box.

COAST GUARD RULEMAKING

(Status as of 1 July 1973)

	Notice of proposed rulemaking	Public hearing	Deadline for comments	Awaiting final action	Withdrawn	Published as rule	Effective date
1972 PUBLIC HEARING							
Tailshaft inspection and drawing (67–71, 4–71)	3–1–72	3–27–72	4–3–72	×			
Stability-wind heel criteria for cargo and miscellaneous vessels (43–71)	3–1–72	3–27–72	4–3–72			6–28–73	7–1–73
Definition of international voyage (12–70)	3–1–72	3–27–72	4–3–72	×			
Portable foam firefighting equipment—tank vessels (17–71)	3–1–72	3–27–72	4–3–72	×			
ANCHORAGE REGULATIONS							
Casco Bay, Maine	6–16–72		7–19–72	×			
Henderson Harbor, N.Y.	6–28–72		8–1–72	×			
St. John's River, Fla. (CGFR 71–162)	12–22–71		1–31–72	×			
San Juan Harbor, P.R. (CGFR 72–12)	2–1–72		3–4–72	×			
Willington River, Ga. (CGFR 71–153)	11–25–71		12–27–71	×			
San Diego Harbor (CGD 72–228)	12–5–72		1–8–73	×			
Hampton Roads, VA (CGD 72–232)	12–5–72		1–9–73	×			
Juan De Fuca, Wash. (CGD 72–233)	12–5–72		1–9–73	×			
Chester River, Md. (CGD 73–10)	1–19–73		2–27–73	×			
Milwaukee Harbor, WI (CGD 73–48)	3–19–73		4–16–73	×			
Barbers Point, Oahu, HI (CGD 73–59)	3–30–73		4–20–73	×			
Sodus Bay, NY (CGD 73–84)	4–27–73		5–29–73	×			
Baltimore Harbor, MD (CGD 73–125)	6–19–73		7–20–73				
Oyster Bay, NY (CGD 73–126)	6–19–73		7–20–73				
Potts Harbor, ME (CGD 73–124)	6–19–73		7–20–73				
BOATING SAFETY (GENERAL)							
Numbering and casualty reporting (CGD 72–54) corrected; F.R. of 11–17–72	4–19–72	5–17–72	5–31–72			10–7–72	7–1–73
Personal Flotation Devices (CGD 72–172, 120, 163)	10–6–72	11–20–72				3–28–73	10–1–73
Personal Flotation Devices, supplementary (CGD 72–120)	1–5–73		1–30–73			3–28–73	10–1–73
Termination of unique vessels (CGD 73–40)	3–14–73	5–8–73	5–14–73	×			
Hazardous bar areas (CGD 73–41)	3–14–73	4–17 & 19–73	5–1–73	×			
BRIDGE REGULATIONS							
Bear Creek, Md. (CGFR 72–17)	2–2–72		3–7–72	×			
Chattahoochee River (CGFR 71–166)	12–29–71	1–26–72 Florida	1–27–72	×			
Idaho State Memorial Bridge, Clearwater River, Lewiston, Idaho (CGFR 71–169)	12–29–71	2–1–72	2–1–72	×			
Interstate I–90 at Lake Washington (CGFR 71–168)	12–21–71	1–27–72 Washington	1–27–72	×			
Raritan R., N.J. (CGD 72–219)	11–8–72	12–14–72	12–29–72	×			
Nansemond R., Va. (CGD 72–244)	11–11–72		12–15–72	×			
John Day R., Blind Slough, Clatskanie R., Oregon (CGD 72–231)	11–28–72		1–2–73	×			
Nanticoke, Del. (CGFR 71–142)	11–24–71		12–24–71	×			
Ogden Slip, Chicago, Ill. (CGFR 72–16)	2–2–72		3–7–72	×			
Sacramento River, Cal. (CGFR 71–165)	12–29–71		2–7–72	×			
Union Pacific RR Co., Columbia River (CGFR 71–167)	12–29–71	2–23–72 Washington	1–27–72	×			
Ohio River at Huntington	6–10–72	7–13–72	7–27–72	×			
Ortega River, Fla.	6–21–72		7–25–72	×			
Clear Creek, Tex. (CGD 72–165P)	8–26–72		10–3–72	×			

Coast Guard Rulemaking—Continued

	Notice of proposed rulemaking	Public hearing	Deadline for comments	Awaiting final action	Withdrawn	Published as rule	Effective date
New River, Fla. (CGD 72–170P)	8–30–72		10–3–72			6–1–73	7–2–73
Pompano Beach, Fla. (CGD 72–158P)	8–22–72		9–26–72	×			
St. Lucie River, Fla. (CGD 72–168P)	8–26–72		10–3–72	×			
West Palm Beach, Fla. (CGD 72–167P)	8–26–72		10–3–72	×			
Back Bay of Biloxi, Miss. (CG 72–173R)						9–7–72 Extended 4–2–73	10–2–72 through 10–19–73
Great Canal, Satellite Beach, Brevard County, Fla. (CGD 72–175PH)	9–13–72	10–30–72	11–13–72	×			
AIWW, Mile 342, Fla.; Drawbridge Operations (CGD 72–190P)	9–30–72		11–1–72	×			
Barnegat Bay, N.J. (CGD 72–211)	10–31–72		12–5–72	×			
Ewing Narrows, Harpswell, Me. (CGD 72–205)	10–17–72	11–21–72	12–6–72	×			
Richardson Bay, Ca. (CGD 72–30)						12–2–72	2–14–73 through 10–6–73
Doctors Pass, Naples, Fla. (CGD 72–242)	12–16–72	1–25–73	2–15–73	×			
Menominee River, WI (CGD 73–12)	1–26–73		3–6–73	×			
Spa Creek, MD (CGD 73–13)	1–26–73		3–6–73	×			
Long Island Inland Waterway (CGD 73–23)	2–12–73		3–30–73	×			
Shaws Cove, CT (CGD 73–72)	4–18–73 corrected 5–1–73		5–18–73	×			
Columbia and Snake R's, WA (CGD 73–95)	5–8–73		6–8–73	×			
Halifax R. FL (CGD 73–52)	3–14–73		4–17–73			5–29–73	7–2–73
Whitcomb Bayou, FL (CGD 73–51)	3–14–73		4–17–73	×			
Coos Bay, OR (CGD 73–108)						5–23–73	10–1–73 through 10–31–73
Isthmus Slough, OR (CGD 73–104)						5–23–73	7–16–73 through 10–31–73
Scuppernong R., NC (CGD 73–111)	5–29–73		7–3–73				
Woodbury Ck. NJ (CGD 73–122)						6–18–73	6–18–73
Passaic R., NJ (CGD 73–123)						6–18–73	8–20–73 through 11–1–73
HAZARDOUS MATERIALS							
Compressed Gas Cylinders (CGD 72–115PH)	8–31–72	9–28–72	10–2–72	×			
Dichlorobutene, Corrected, F.R. 9–20–72, Hazardous Cargoes (CGD 72–162PH)	8–30–72	10–24–72	10–31–72	×			
Certification of Cargo Containers for Transport under Customs Seal (CGD 72–139)	11–17–72		12–19–72	×			
Metal Borings, Shavings, Turnings & Cuttings (CGD 72–229)	12–5–72	1–11–73	3–1–73	×			
Exemption to Etiologic Agents Requirements (CGD 72–226)	12–13–72	1–23–73	1–30–73			3–29–73	6–30–73
Shipment of DOD material sold to shipper (CGD 73–42)	3–22–73	4–17–73	4–24–73	×			
Miscellaneous Dangerous Cargoes (CGD 72–182)	11–11–72	12–12–72	12–19–72	×			
Letters of compliance, Subchapter 0, Bulk Dangerous Cargoes, Interim regulations (CGD 72–80)						6–15–73	6–15–73[1]
MARINE ENVIRONMENT AND SYSTEMS (GENERAL)							
Oil pollution prevention (CGFR 71–160, 161)	12–24–71	2–15–72	4–21–72	×		12–21–72	7–1–74
Marine Sanitation Devices (CGD 73–83)	Adv. Notice 6–18–73		8–15–73				

[1] Some requirements not effective until 1–1–74, *see* Federal Register Part III of 6–15–73.

	Notice of proposed rulemaking	Public hearing	Deadline for comments	Awaiting final action	Withdrawn	Published as rule	Effective date
MERCHANT MARINE SAFETY (GENERAL)							
Oceanographic vessels, fire main systems (CGFR 72–20)	2–4–72		3–19–72	×			
Washroom and toilet facilities (CGFR 72–4)	1–15–72		3–20–72	×			
Water lights, floating electric (CGFR 72–48)	3–9–72	4–18–72	4–24–72	×			
Great Lakes Maritime Academy, List as a Nautical School-Ship (CGD 72–92P)	8–9–72		9–15–72	×			
Ship's Maneuvering Characteristics Data (CGD 72–132PH)	8–22–72	9–28–72	10–13–72	×			
Unmanned Barges; hull construction (CGD 72–130)	10–31–72	12–19–72	12–29–72	×			
Marine Engineering Systems and Components (CGD 72–206)	11–17–72	12–12–72	12–20–72			6–29–73	10–1–73
Remote Valve Controls (CGD 72–57)	11–17–72		12–19–72			5–1–73	8–1–73
Update of Examination Requirements for Second and Third Mate (CGD 72–151)	11–16–72		1–1–73			5–8–73	7–6–73
Towboat operator licensing (CGD 72–132)	8–11–72	9–13, 20, 26, & 27–72	1–15–73			3–2–73	9–1–73
Certain Bulk Dangerous Cargoes; Transverse stability requirements (CGD 72–130)	10–31–72	12–19–72	12–30–73			5–1–73	8–1–73
Construction requirements for tank ships (CGD 72–245)	Adv. Notice 1–26–73		3–15–73	×			
Wiring methods and materials for hazardous locations (CGD 73–6)	2–14–73		3–16–73	×			
Emergency Position Indicating Radio Beacons (CGD 73–24)	3–5–73	4–18–73	4–30–73	×			
Firemen's outfits on manned tank barges (CGD 73–11)	4–26–73	On request	5–28–73	×			
Dry chemical fire extinguisher requirements (CGD 73–73)	6–8–73		7–10–73				

NOTE: This table which will be continued in future issues of the Proceedings is designed to provide the maritime public with better information on the status of changes to the Code of Federal Regulations made under authority granted the Coast Guard. Only those proposals which have appeared in the Federal Register as Notices of Proposed Rulemaking, and as rules will be recorded. Proposed changes which have not been placed formally before the public will not be included.

SPEED COMMUNICATION

(*Continued from page 169*)

in London of the IMCO subcommittee on radio communications, AIMS Telecommunications Committee Chairman David Newman, of Exxon Co., discussed navigation capability of a maritime satellite. Some foreign nations thought it would cost too much, but were favorably impressed by the AIMS estimate of costs. More interest in maritime satellite communications apparently was generated.

Early in March, the Navy announced signing of a $28 million contract with Communications Satellite Corporation, COMSAT, which will lease a portion of two communications satellites to the Navy for a two year period. Service is to begin September 1 and will allow the Navy to use two satellites in 23,000 mile orbits, one over the Atlantic and one over the Pacific. They will be used until the Navy develops its own satellite communications system.

During their five year lifetime, the satellites could be used to provide the communications system the maritime industry so badly needs. COMSAT estimates launch and maintenance of the two satellites will cost $70 million.

AIMS now is polling the maritime industry to determine an industry position. It would seem that a door has been opened. It's now up to the maritime industry whether or not they will follow in the footsteps of those who already have moved mankind one giant stride forward in the field of long-distance communications. ⚓

nautical queries

The following questions are presented as being representative of the type to be used in the forthcoming examinations for Operator Of Uninspected Towing Vessels, other than those persons who are qualified under the so-called "Grandfather Clause." It is hoped that they will prove of value to future candidates and to training institutions. They are intended to be used in conjunction with the information contained in the July 1973 issue of the *Proceedings* concerning the examination specifications, reference books to be studied in preparation for the examination, or to be used during the open book portion of the examination. The following coding is used to indicate the route for which questions are considered appropriate.

Oceans (all routes outside Inland Waters)—O
Inland Waters—INL
Western Rivers—WR
Great Lakes—GL

GENERAL (Not Open Book)

SEAMANSHIP

1. Before beginning to tow a large barge on a hawser in open waters, good seamanship requires that the licensed operator of the towing vessel insure all of the following *except*

A. proper running lights are rigged.
B. a means for quick release of towing hawser is provided.
C. a pick up wire is rigged on tow.
D. insurance underwriter has completed survey.
(O, INL, GL)

BOATMANSHIP

1. What could cause the water to boil up around a tow underway in a buoyed channel?

A. A strong head current
B. A sudden cross current
C. A swift following current
D. Shallow water
(WR)

FIRE FIGHTING AND LIFESAVING

1. The purpose of fuses in electric wiring is to

A. allow for cutting out branch circuits.
B. prevent overloading the circuits.
C. reduce voltage to the branch circuits.
D. permit the use of smaller wiring for lighting circuits.
(O, INL, WR, GL)

2. You are proceeding down river and a bad bilge fire has broken out in the engine room. Which of the following should you do?
1. Stop your vessel and secure all ventilation to the engine room.
2. Evacuate the engine room and use the CO_2 fixed system.

A. 1 only
B. 2 only
C. Both 1 and 2
D. Neither 1 nor 2
(O, INL, WR, GL)

NAVIGATION (INSTRUMENTS, AIDS, TERMINOLOGY, WINDS AND WEATHER)

1. The chart indicates that the true bearing of a range is 355°. When your vessel is lined up on the range and steady, you note your compass heading is 000°. What is the compass error?

A. 5° East
B. 10° West
C. 5° West
D. 10° East
(O, INL, GL)

2. Variation is caused by

A. worn gears in the compass housing.
B. magnetism from the earth's magnetic field.
C. magnetism within the vessel.
D. lack of oil in the compass bearings.
(O, INL, GL)

3. Readings on a fathometer indicate

A. actual depth of water.
B. actual depth of water below keel.
C. average depth from waterline to hard bottom.
D. average depth of water to soft bottom.
(O, INL, GL)

4. Reports of channel conditions, soundings, etc., are contained in
1. Channel Reports.
2. Navigation Bulletin.

A. 1 only
B. 2 only
C. Both 1 and 2
D. Neither 1 nor 2
(WR)

5. A solid red buoy may show which of the following colored lights?

A. Red only
B. White only
C. Either red or white
D. Green
(O, INL, WR, GL)

6. When should a navigator rely on the position of floating aids to navigation?

A. During calm weather
B. During daylight only
C. Only when inside a harbor
D. Only when fixed aids are not available
(O, INL, WR, GL)

7. What is the meaning of an outdraft above a Lock?

A. The current is pulling your vessel away from the Lock approach.
B. The current is pushing your vessel into the bank.
C. The current is churning at

the Lock and twisting the head of the tow.

D. The current is pushing your vessel into the Lock too fast. (WR)

8. What publication contains descriptions of the coast line, buoyage system, weather conditions, port facilities, and navigation instructions for the United States and its possessions?

A. Coast Pilots
B. Sailing Directions
C. Port Index
D. Light List
(O, INL)

9. You are proceeding up a channel which is subject to tidal currents. Your estimated speed is 7 knots. However, a 30 minute run between navigational aids indicates that you are making 8.5 knots. Which of the following would best describe the stage of tide at that time?

A. Flood
B. Ebb
C. Stand
D. Slack
(O, INL)

10. You are being sent from the East Coast to operate a tug on Puget Sound. Which publication should you check for complete information on Puget Sound weather conditions?

A. Sailing Directions
B. Light Lists
C. Coast Pilot
D. C & GS Charts
(O, INL)

11. On the Mississippi and Ohio Rivers, there is a special type of fog known as steam fog. It is caused by

A. Warm air passing over much colder water.
B. Cold air passing over much warmer water.
C. A rapid cooling of the ground on a clear night.
D. Rain coming out of a warm air mass aloft.
(WR)

RULES OF THE ROAD

No questions are included here as those will correspond closely to those contained in the "grandfather" examinations.

SAFETY (Open Book)

Rules and Regulations, Safety Equipment, Pollution, First Aid, Ships' Business, Radio Communications.

1. Your tug is underway with six gasoline barges. All of the following persons would meet the requirement for a tankerman on board the towboat *except*

A. licensed Pilot.
B. licensed Master.
C. Grade A and lower tankerman.
D. licensed Operator of Uninspected Towing Vessels.
(O, INL, WR, GL) (Refer to CG–123, Rules and Regulations for Tank Vessels)

2. What is the minimum number of hand portable fire extinguishers required on a 90 gross ton, 1200 brake horsepower uninspected towing vessel?

A. 1 type B–II
B. 2 type B–II
C. 3 type B–II
D. 4 type B–II
(O, INL, WR, GL) (Refer to CG–258—Rules and Regulations for Uninspected Vessels)

3. The problem of oil pollution of the oceans and other waters results from

1. vessel casualties such as collisions, groundings, and cargo spills.
2. pumping overboard of normal ballast, bilge cleanings, and tank washings.

A. 1 only
B. 2 only
C. Both 1 and 2
D. Neither 1 nor 2
(O, INL, WR, GL)

4. U.S. Coast Guard regulations require that a Cargo Information Card be carried on the bridge or pilot house of a vessel towing tank barges containing cargoes regulated by Subchapter O of the regulations. A separate Cargo Information Card must also be

A. carried by the tankerman aboard the barge.
B. given to every lockmaster before passing through each lock.
C. mounted near a warning sign on the barge so that it is easily read.
D. mounted outside of the pilot house of the tug in a weatherproof bracket.
(O, INL, WR, GL) (Refer to CG–123 or Subchapter "O")

5. If sulfuric acid is spilled on your skin

A. cover with a clean cloth.
B. apply petroleum base ointment.
C. immediately flush with water.
D. allow to dry and call a physician.
(O, INL, GL, WR) (Refer to Cargo Information Card)

6. If you are guilty of failure to properly perform your duties as Operator of Uninspected Towing Vessels, all of the following actions may be taken *except*

A. letter of warning issued.
B. suspension of your license.
C. revocation of your license.
D. fine placed against your license.
(O, INL, GL, WR) (Refer to CG–200, Investigation and Suspension Regulations)

7. Before taking drinking water on board in the U.S. or its possessions, the responsible person from the vessel should determine that the source

A. is used by a city.
B. has been treated with chlorine.
C. is approved by the Public Health Service.
D. is not from surface water.
(O, INL, GL, WR)

8. Any person maintaining a listening watch on a bridge-to-bridge

radio-telephone must be able to

A. speak English.

B. repair the unit.

C. speak Spanish.

D. send Morse Code.

(O, INL, WR, GL) (Refer to CG–439, Bridge-to-Bridge Radiotelephone Communications)

NAVIGATION PROBLEMS

The following is a typical question from the chart problem that each candidate will be required to solve.

1. Assume your 2100 position is Lat. 41°–15′ N., Long. 71°–46′5 W., and you estimate that set and drift for the next two hours will be 260° at 0.5 knots. What course should you steer allowing leeway to pass 1.5 miles north of Cerberus Shoal Buoy? You are making RPM's for 5 knots.

A. 065° True

B. 243° True

C. 245° True

D. 247° True

(O, INL) (Use chart C. & G.S. 1211)

The following are typical of the type question which will require reference to publications available in the exam room.

2. On the morning of 30 October 1971 what time will it be high water at Providence, Rhode Island?

A. 0406

B. 0420

C. 0326

D. 0512

(O, INL) (Use Tide Tables 1971)

3. Vessels operating or anchoring in the area of the Chesapeake Bay Bridge Tunnel Complex are cautioned of

1. strong winds from the northwest quadrant.

2. currents in excess of 3.0 knots can be expected.

A. 1 only

B. 2 only

C. Both 1 and 2

D. Neither 1 nor 2

(O, INL) (Use Coast Pilot—3)

4. At 0800 on 2 June 1971 you departed from Cairo, Ill. (Gauge) with a large tug boat pushing a tow averaging 12 M.P.H. What will be your arrival time at Baton Rouge, Louisiana?

A. 1158, 4 June 1971

B. 1527, 4 June 1971

C. 1855, 4 June 1971

D. 2030, 4 June 1971

(WR) (Use U.S. Corps of Engineers Navigation Map Book, Lower Mississippi River)

5. To obtain a general description of each of the Great Lakes and Rivers you would use

A. Coast Guard Light List, Volume IV.

B. the Seaway Handbook.

C. Great Lakes Pilot.

D. St. Lawrence Seaway Master's Handbook.

(GL)

A Great Lakes chart problem question is not presented here but will be similar in nature to number 1 above utilizing a Great Lakes chart and local terminology.

Celestial navigation problems for unlimited ocean routes are not presented here but will be similar to those in use in present examinations.

(*See answers on page 178.*)

AMENDMENTS TO REGULATIONS

TITLE 46—SHIPPING

Chapter I—Coast Guard, Department of Transportation

SUBCHAPTER I—CARGO AND MISCELLANEOUS VESSELS

[CGD 73–120]

PART 93—STABILITY

Wind Heel Criteria for Cargo and Miscellaneous Vessels

The purpose of this new subpart is to establish stability criteria for cargo and miscellaneous vessels.

Their substance was published as a notice of proposed rulemaking in the Federal Register on March 1, 1972 (37 FR 4292), and full text in the Marine Safety Council Public Hearing Agenda CG–249 for March 27, 1972, a public hearing was held at U.S. Coast Guard Headquarters in Washington, D.C. No oral testimony was preseoted. However, six written comments were submitted.

Mr. Richard H. Riley of Defoe Shipbuilding Co., Bay City, Michigan, recommended that a formula for "P" for winter operations on the Great Lakes be added and that summer be defined. Both suggestions have been adopted, to avoid confusion.

Two comments suggest a number of additions to the proposed regulations. These are being studied now and will probably be included in a future proposal.

One comment questions the authority. This is due to a misunderstanding. The two conventions at issue are the reasons, not the authority for the proposal. The authority is statutory, as cited at the end of the regulations.

Two other comments pointed out that § 93.07–90 seems to have been omitted. This was due to an oversight and the section is being added now. A notice for this addition has been found to be unnecessary, particularly since it only clarifies the existing rules and does not impose any burden on anyone.

In consideration of the foregoing, Part 93 of Title 46 of the Code of Federal Regulations is ameoded as follows:

1. The table of contents is amended by inserting the following after "93.05–5 Procedure" and before "Subpart 93.10:"

Subpart 93.07—Stability Standards

Sec.
93.07–1 Application.
93.07–5 General.
93.07–10 Weather criteria.
93.07–15 Special cases.
93.07–90 Existing vessels.

AUTHORITY: 46 U.S.C. 375, 391, 416; 49 U.S.C. 1655(b); 49 CFR 1.4(b) and 1.46(b).

2. A new subpart is added, preceding "Subpart 93.10", as follows:

Subpart 93.07—Stability Standards

§ 93.07–1 Application.

(a) The provisions of this Subpart apply as a minimum to all vessels contracted for after July 1, 1973 for an international and coastwise voyage and any other vessel whose stability is being considered by the Officer in Charge, Marine Inspection. Vessels contracted for prior to July 1, 1973 must meet the requirements in § 93.07–90.

§ 93.07–5 General.

All vessels within the purview of this part must be designed so as to be able to provide sufficient stability in an impact condition in all service conditions.

§ 93.07–10 Weather criteria.

The required minimum metacentric height (GM) in feet at any particular draft is obtained from the following formula:

$$GM = \frac{PAh}{\Delta \tan\Theta}$$

Where:

$P = 0.005 + \left[\frac{L}{14,200}\right]^2$ tons/ft² for oceans, coastwise service and for the Great Lakes in winter (Oct 1–Apr 15).

$P = 0.0033 + \left[\frac{L}{14,200}\right]^2$ tons/ft² for partially protected waters such as lakes, bays, sounds and for the Great Lakes in summer (Apr 16–Sept 30).

$P = 0.0025 + \left[\frac{L}{14,200}\right]^2$ tons/ft² for protected waters such as rivers and harbors.

L = Length between perpendiculars in feet.
A = Projected lateral area in square feet of portion of vessel above water line.
h = Vertical distance in feet from center of A to center of underwater lateral area or approximately one-half draft point.
Δ = Displacement in long tons.
Θ = Angle of heel to one-half the freeboard to the deck edge or 14 degrees whichever is less. (For vessels having a discontinnous weather deck or abnormal sheer, the angle to one-half the freeboard may be suitably modified.)

§ 93.07–15 Special cases.

(a) The criteria specified in § 93.07–10 are generally limited in application to flush deck mechanically powered vessels of ordinary proportions and form which carry cargo below the main deck. For other vessels, additional calculations showing that the vessel has a safety level equivalent to that achieved by Section 93.07–10 must be submitted. The extent of such calculations will be determined hy the Commandant.

§ 93.07–90 Existing vessels.

(a) Vessels contracted for prior to July 1, 1973, must meet the requirements specified in this section.

(b) Existing arrangements, materials, and facilities previously approved will be considered satisfactory so long as they meet the minimum requirements of this section and they are maintained in a suitable condition to the satisfaction of the Officer in Charge, Marine Inspection. Minor repairs and alterations may be made to the original standards.

(c) In general, the standards of stability previously attained should be maintained. In this regard, no change or modification may result in a lower level of stability than that which existed before the change or modifications. This is intended to include the normal additions and subtractions which occur over the life of the ship.

Effective date: This amendment is effective July 1, 1973.

Dated: June 18, 1973.

T. R. SARGENT,
Vice Admiral, U.S. Coast Guard,
Acting Commandant.

(Federal Register of June 28, 1973)

TITLE 46—SHIPPING

Chapter I—Coast Guard
Department of Transportation

[CGD–72–206R]

SUBCHAPTER F—MARINE ENGINEERING

SUBCHAPTER I—CARGO AND MISCELLANEOUS VESSELS

SUBCHAPTER Q—SPECIFICATIONS

SUBCHAPTER T—SMALL PASSENGER VESSELS

MARINE ENGINEERING SYSTEMS AND COMPONENTS

The purpose of these amendments is to update Coast Guard regulations to reflect new industry codes and standards and new marine engineering practices. The amendments are based on a notice of proposed rulemaking (CGD 72–206PH) issued on November 17, 1972 (37 FR 24435). That notice described the changes and solicited comments from interested parties. No comments were received.

A public hearing on the proposed regulations was also held on December 12, 1972 and no comments were made.

In consideration of the foregoing, the amendments as proposed are adopted without change.

Effective date. These amendments are effective October 1, 1973.

Dated June 22, 1973.

C. R. BENDER,
Admiral, U.S. Coast Guard,
Commandant.

(The complete text of these amendments was published in the Federal Register of June 29, 1973.)

ZERO in ON SAFETY

Safety as Others See It

Safety Is Proper Communication

Imagine what would happen if our ability to communicate were removed. Chaos, followed by extinction, could be our lot. Yet, we sometimes accept our ability to communicate with a casualness that borders on disdain.

As an example, safety education, like most other educational programs, is entirely dependent upon communication (and $$$). From a few weeks after birth until that final day of reckoning, each of us is constantly being guided in methods of self-preservation and accident prevention.

Parents, the media, government, military, industry, schools, ad infinitum, regularly alert us to hazards associated with unsafe practices. Why then do so many preventable accidents occur every year? Is it just human nature to take unnecessary risks or is it a breakdown in proper communication? Most likely it's a combination of both.

There are those few unfortunate people who refuse to listen to anything concerning their well-being. They recklessly race through life until one day the odds catch up with them and they end up as accident statistics. Too often innocent bystanders are killed or injured because of these people.

Thankfully, the great majority are safety conscious and make every attempt to follow the rules and regulations of the activity in which they are participating. However, it is sad to note that, on occasion, even these people lower their safety guard and take chances which lead to mishaps. How can they be persuaded not to throw caution to the wind? Through proper communication, that's how.

There are few people who never have the opportunity to counsel others on the safest and most efficient way to accomplish a given task. It's during these direct confrontations with individuals and groups that the right words must be used. This ensures that those listening understand what was said and if called upon to perform a related task, they would know how to do it.

Why does a "good" leader get his men to do their work willingly? He ensures that they are properly trained and motivated to perform their tasks safely and knowledgeably. When a tedious job is encountered, well-informed and trained men are doubly alert to the possibility of error.

When dealing with safety, everyone must be a leader. Whatever your position, if you see someone doing something in a unsafe manner, call it to his or her attention. Actually, you're doing them a favor.

When you show someone how to do a job, make sure they fully understand you. By the same token, when you're learning a certain task, make sure you fully understand the procedures.

This is what it's all about. This is proper communication. This is safety.

—*Courtesy Naval Safety Center* Lifeline

ANSWERS TO NAUTICAL QUERIES

Seamanship
1. D

Boatmanship
1. D

Fire Fighting and Lifesaving
1. B
2. C

Navigation
1. C
2. B
3. B
4. C
5. C
6. D
7. A
8. A
9. A
10. C
11. B

Safety
1. D
2. D
3. C
4. C
5. C
6. D
7. C
8. A

Navigation Problems
1. D
2. B
3. C
4. D
5. C

MERCHANT MARINE SAFETY PUBLICATIONS

The following publications of marine safety rules and regulations may be obtained from the nearest marine inspection office of the U.S. Coast Guard. Because changes to the rules and regulations are made from time to time, these publications, between revisions, must be kept current by the individual consulting the latest applicable Federal Register. (Official changes to all Federal rules and regulations are published in the Federal Register, printed daily except Saturday, Sunday, and holidays.) The date of each Coast Guard publication in the table below is indicated in parentheses following its title. The dates of the Federal Registers affecting each publication are noted after the date of each edition.

The Federal Register will be furnished by mail to subscribers, free of postage, for $2.50 per month or $25 per year, payable in advance. The charge for individual copies is 20 cents for each issue, or 20 cents for each group of pages as actually bound. Remit check or money order, made payable to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Regulations for Dangerous Cargoes, 46 CFR 146 and 147 (Subchapter N), dated October 1, 1972 are now available from the Superintendent of Documents price: $5.75

CG No.	TITLE OF PUBLICATION
101	Specimen Examination for Merchant Marine Deck Officers (7–1–63).
108	Rules and Regulations for Military Explosives and Hazardous Munitions (4–1–72). F.R. 7–21–72, 12–1–72.
115	Marine Engineering Regulations (7–1–70) F.R. 12–30–70, 3–25–72, 7–18–72, 8–19–72, 5–1–73, 6–29–73.
123	Rules and Regulations for Tank Vessels (1–1–73).
129	Proceedings of the Marine Safety Council (Monthly).
169	Rules of the Road—International—Inland (8–1–72). F.R. 9–12–72.
172	Rules of the Road—Great Lakes (7–1–72). F.R. 10–6–72, 11–4–72, 1–16–73, 1–29–73, 5–8–73.
174	A Manual for the Safe Handling of Inflammable and Combustible Liquids (3–2–64).
175	Manual for Lifeboatmen, Able Seamen, and Qualified Members of Engine Department (3–1–73).
176	Load Line Regulations (2–1–71) F.R. 10–1–71, 5–10–73.
182	Specimen Examinations for Merchant Marine Engineer Licenses (7–1–63).
184	Rules of the Road—Western Rivers (8–1–72). F.R. 9–12–72, 5–8–73.
190	Equipment List (8–1–72). F.R. 8–9–72, 8–11–72, 8–21–72, 9–14–72, 10–19–72, 11–8–72, 12–5–72, 1–15–73, 2–6–73, 2–26–73, 3–27–73, 4–3–73, 4–26–73, 6–1–73.
191	Rules and Regulations for Licensing and Certification of Merchant Marine Personnel (6–1–72). F.R. 12–21–72, 3–2–73, 3–5–73, 5–8–73, 5–11–73, 5–24–73.
200	Marine Investigation Regulations and Suspension and Revocation Proceedings (5–1–67). F.R. 3–30–68, 4–30–70, 10–20–70, 7–18–72, 4–24–73.
220	Specimen Examination Questions for Licenses as Master, Mate, and Pilot of Central Western Rivers Vessels (4–1–57).
227	Laws Governing Marine Inspection (3–1–65).
239	Security of Vessels and Waterfront Facilities (3–1–72). F.R. 5–31–72, 11–3–72, 7–8–72, 1–5–73.
249	Marine Safety Council Public Hearing Agenda (Annually).
256	Rules and Regulations for Passenger Vessels (5–1–69). F.R. 10–29–69, 2–25–70, 4–30–70, 6–17–70, 10–31–70, 12–30–70, 3–9–72, 7–18–72, 10–4–72, 10–14–72, 12–21–72, 4–10–73.
257	Rules and Regulations for Cargo and Miscellaneous Vessels (8–1–69). F.R. 10–29–69, 2–25–70, 4–22–70, 4–30–70, 6–17–70, 10–31–70, 12-30-70, 9–30–71, 3–9–72, 7–18–72, 10–4–72, 10–14–72, 12–21–72, 6–28–73, 6–29–73.
258	Rules and Regulations for Uninspected Vessels (5–1–70). F.R. 1–8–73, 3–28–73.
259	Electrical Engineering Regulations (6–1–71). F.R. 3–8–72, 3–9–72, 8–16–72.
266	Rules and Regulations for Bulk Grain Cargoes (5–1–68). F.R. 12–4–69.
268	Rules and Regulations for Manning of Vessels (10–1–71). F.R. 1–13–72, 3–2–73.
293	Miscellaneous Electrical Equipment List (9–3–68).
320	Rules and Regulations for Artificial Islands and Fixed Structures on the Outer Continental Shelf (7–1–72). F.R. 7–8–72.
323	Rules and Regulations for Small Passenger Vessels (Under 100 Gross Tons) (12–1–71). F.R. 3–8–72, 3–25–72, 6–24–72, 7–18–72, 9–13–72, 12–8–72, 12–21–72, 1–8–73, 3–5–73, 6–29–73.
329	Fire Fighting Manual for Tank Vessels (7–1–68).
439	Bridge-to-Bridge Radiotelephone Communications (12–1–72).

CHANGES PUBLISHED DURING JUNE 1973

The following have been modified by Federal Registers:

CG–115, Federal Register of June 29, 1973.

CG–190, Federal Register of June 1, 1973.

CG–323, Federal Register of June 29, 1973.

CG–257, Federal Registers of June 28 and 29, 1973.