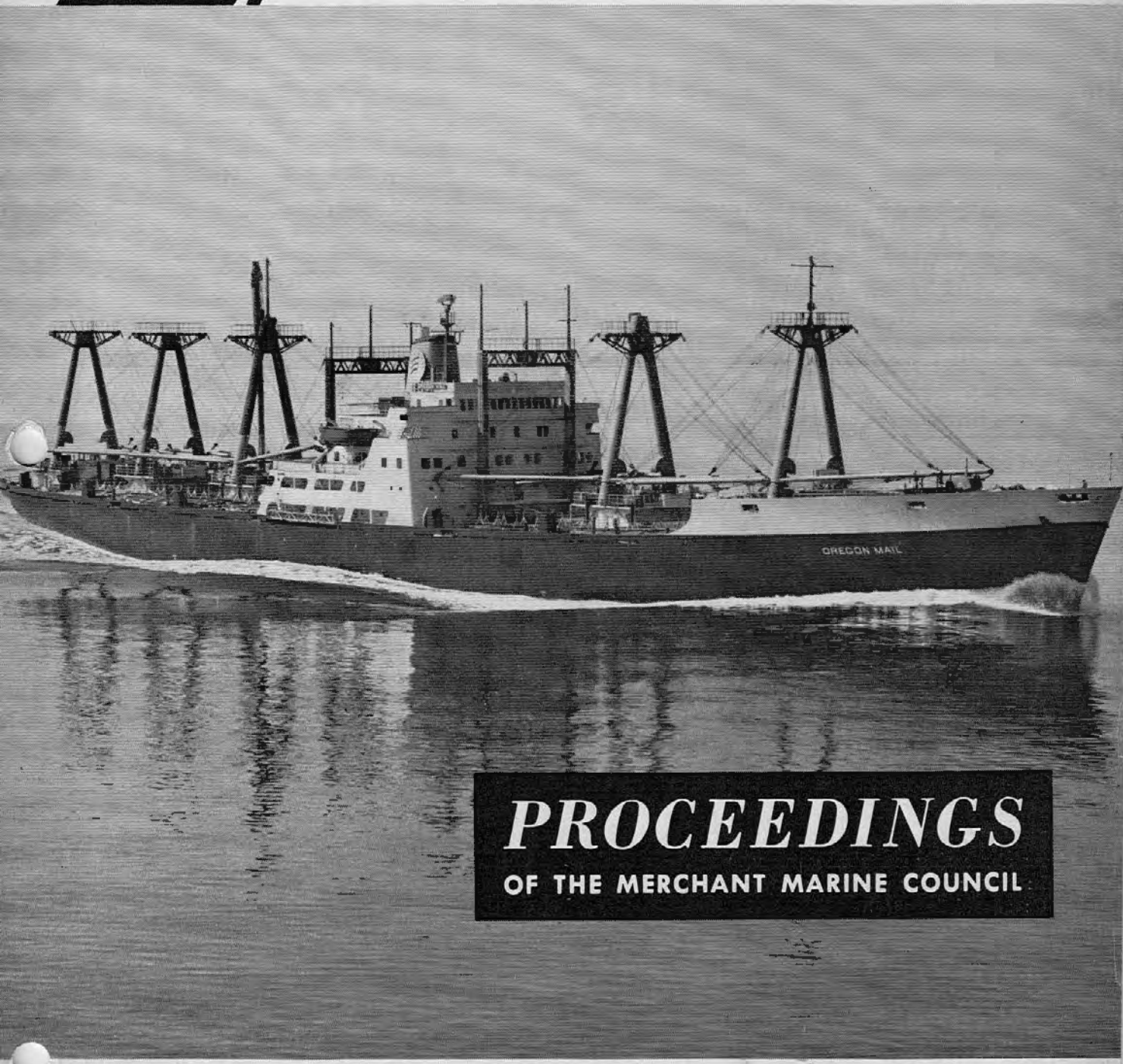
COAST GUARD



PROCEEDINGS

OF THE MERCHANT MARINE COUNCIL

Vol. 25, No. 4 CG–129 April 1968

PROCEEDINGS

OF THE

MERCHANT MARINE COUNCIL

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U.S. Coast Guard 1967 . . .

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

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COVERS

FRONT: The freighter *Oregon Mail* underway. The vessel's gross tonage is 12,716, and her home port is Portland, Oreg. *Courtesy American Mail Line.*

BACK: A radar plot *courtesy, Safety Bulletin, Chevron Shipping Company.* The Annex to the Rules of the Road emphasizes the necessity for the proper interpretation of radar information.

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A: abcdew(2); fghijklmnopqrstuv(1)
B: n(40); c(16); e(5); f(4); gh(3); bdikmopq(1)
C: abcdefgimnou(1)
D: i(5); abcdefklmruvw(1)
E: d(1)
F: p(1)
List 141M
List 111

Navigational Aids Abused

MORE SINNED AGAINST THAN SINNING

John Leuchars

SINCE RADAR CAME into commercial use at sea, the term "misuse of radar" has frequently been heard, generally in the course of an official inquiry into the causes of collision or stranding. Usually it implies misinterpretation by users of the information given by this aid to safe navigation.

Not so often heard, but much more common than one might think, is sheer abuse of radar and other electronic equipment on which the safety of a ship and her personnel may depend. Not the abuse an irate master might hurl at a blank-eyed cyclops of a radar that has broken down, but the kind that could very well cause it to break down at a critical moment.

SO SIMPLE

Most of such instances are simple in themselves. Some are almost comic—some almost incredible. Yet they do occur, and enumerating a few examples of abuses that have actually happened may help to prevent recurrences in future. Doing so may conceivably give offense to the vast majority of careful users of equipment, but there is no intent to criticize, and even less to poke fun at the few who undoubtedly do at times treat with less than proper care the equipment on which their very lives may depend. One thing more—some

The following article is reprinted with the permission of the editor of the publication "Safety at Sea International."

of the examples quoted are no longer possible with current equipment, but they did in fact happen.

SO TEMPTING

Radar is perhaps one of the most vulnerable items of marine electronic equipment if only because the display unit on the bridge is accessible at one time or another to personnel who themselves are not authorized to use it or indeed to touch it. These may he crewmembers or, while the ship is in port, shore workmen or even visitors. Most of us suffer from the urge to twiddle knobs if there are any within reach, and there is, too, an element of what-the-butler-saw about a radar screen which is tempting to the inexpert. Let's turn this knob and see if anything happens. Nothing. Turn it a bit more. Cor, it's stiff! Oops! a little later the bridge is manned and the navigating officer switches on the radar only to find that the range-change switch is inoperative and he's stuck with a 48-mile range for close work going downriver.

With luck and the right circumstances, it might be possible to get the manufacturer's representative on board in time to repair the set he checked as in perfect order only a couple of days before. This may not cost lives, but it certainly costs money.

STRANGE SOUNDS

Radars with push-button switching also attract their share of unauthorized finger work. While berthed in the Clyde recently the second officer of a ship equipped with one of these sets heard strange sounds from the wheelhouse and walked in to find a welder thumping the keys and giving a spirited rendering of "Scotland the Brave" in a voice apparently intended to resemble a piano-accordion. No damage, except perhaps to the welder's larynx, but . . .

In the earlier days of radar some sets were fitted with a lid with lock and key. Perhaps a return to this practice would save in-port damage. But abuses occur at sea as well. Knobs on some of the older sets, consisting of a large flange on a small boss, were ideal for hanging things on. On one such set, now obsolete, the range-change switch, knob operated, was on the bottom left of the display panel, and was fitted with a small metal arrowhead to indicate the range in use.

MILES OUT

On a dark but clear night a ship with such a set, switched to the 10-

mile range, was well out to sea when the officer of the watch saw a target come up at extreme range. Taking his binoculars from where he usually kept them, hung by the strap on the range-change knob, he went out to the wing of the bridge, searched for the lights of the other ship, then returned to the radar to see the target apparently almost on top of him. He had the helm put hard over to clear the other ship's course before he realized that in snatching his binoculars the strap had caught on the arrowhead pointer and switched the radar over to the 40-mile range. He never hung them there again. An intelligent man, just thoughtless in this one matter, he knew that it might have been the other way round to give him an assumption of safety where none existed.

Some radars with a horizontal or near horizontal display come in for their share of sheer maltreatment. A flat surface is handy for putting things on, especially if it has a nice raised rim to keep them from sliding off in a roll. Pencils, pads of paper, cigarette packets and boxes of matches are harmless enough, but when it comes to pint mugs of tea . . . well, a few scratches on the filter screen are the least to be expected, introducing the possibility of a sort of do-it-yourself parallax effect.

But the classic of all so far recorded was the case of the drifter skipper who complained, trip after trip, that his radar was getting dimmer and dimmer. Each trip it was checked, time and again it was checked—always perfect. And time and again the skipper insisted, through the haze of his cigarette smoke, that as soon as he got to sea it went dim.

This went on for months, leaving the technicians baffled and the skipper in mounting dissatisfaction, until one time in port he mentioned the magnifying lens. A couple of questions established the fact that he always used it at sea. A quick look at it revealed the film of cigarette ash on the lens inside the hood, and a quick wipe with a duster settled another abstruse technical problem. "Well," admitted the skipper, "sometimes a bit of ash drops in, like, but I always empties it out again." Possibly he had never, as a boy, played at picking up bits of paper on the end of a rubbed fountain pen. Certainly he knew nothing of the electrostatic attraction inherent in some plastic materials.

PAINTERS AT WORK

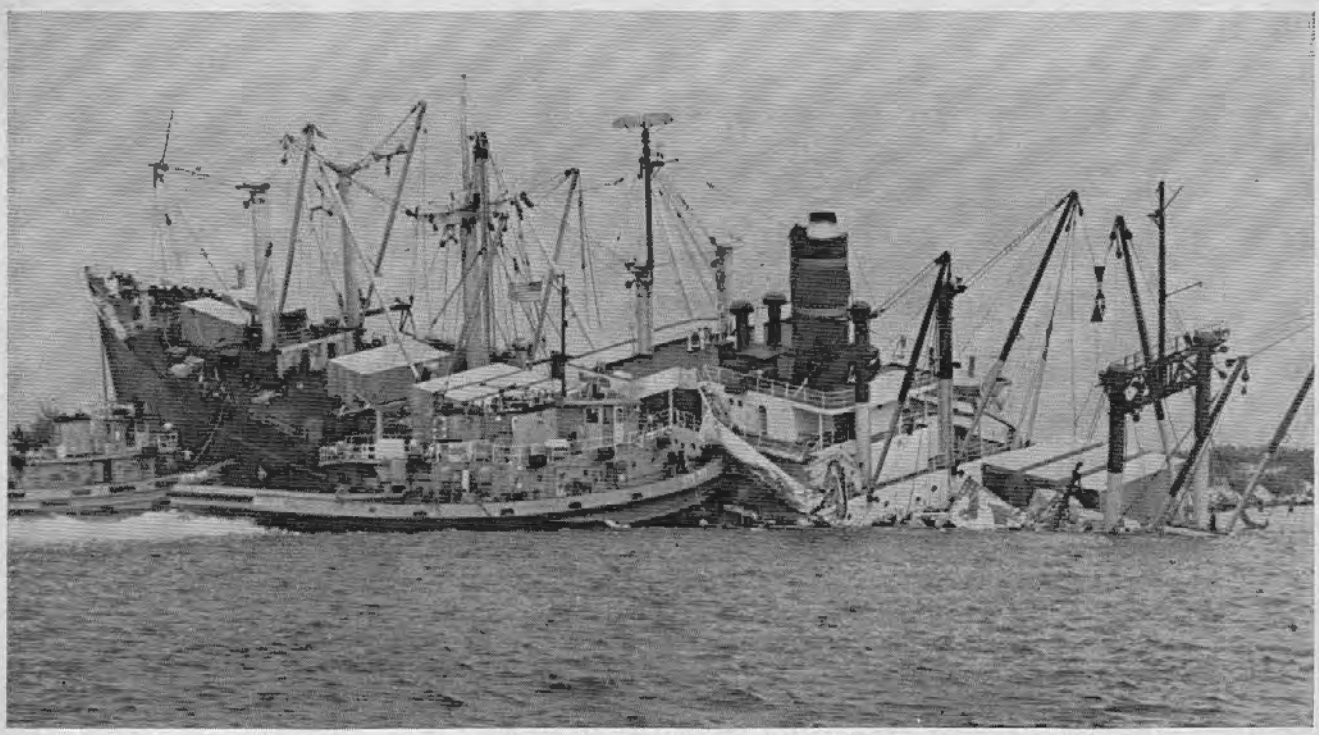
The impetuously or carelessly wielded paintbrush can also be an enemy of radar or D.F., despite "Do Not Paint" notices on certain parts of scanners and loop aerials. With some older types of scanner, a wipe of the brush across the plastic "window" on the end of the hog-horn can completely blind the radar; and a careless slap or even a drip of lead-base paint over the insulation block between the D.F. loops and their pedestal makes a quite effective short circuit to earth. The modern end-fed slotted-waveguide type of radar scanner is not so vulnerable, but an eye should be kept on painting gangs working on monkey island—particularly if they are Asiatics who may not even be able to read "Do Not Paint" in English.

D.F. loops, too, are rather handy things to have about. So convenient to take a turn round them with a halliard—just temporarily, mind—and then forget about it. Forget that a damp rope is a conductor of electricity and can introduce a dangerous error into D.F. bearings—just enough to put a ship aground. The radio officer will naturally be on his guard against other, more permanent attachments such as a clothesline, or even a wire aerial for a personal radio set. But the apparently harmless halliard is more common than one might think.

The D.F. receiver, if fitted in the chartroom, can get its share of ill treatment, as in the case of the two apprentices in a ship who used one regularly as a form of roulette wheel, spinning the goniometer pointer and betting on the sector in which it would come to rest. Luckily for the D.F., if unfortunately for them, they were caught at it and the practice ceased forthwith. Luckily, too, it was a good solid set and suffered no harm during their time "at the tables". But it might have been thrown a few degrees out of alinement. A ship might have been lost with all hands, and nobody would ever have known the cause.

CIRCUIT BREAKER

Other strange things can happen to D.F. installations. During the war, a wiring job by a shore electrician nearly caused another war between the radio office and the engine room. In this ship the D.F. was fitted in the chartroom, complete with its battery charging board, and the radio officer would switch the batteries on charge, check the ammeter reading on the board, and leave the chartroom. Some hours later he would return to take his batteries off charge only to find that, with the switch still in, the ammeter showed that no charging was taking place. Words ensued between him and the engineer on watch, whom he accused of pulling the supply switch in the engine room since it was obvious that no mains electricity was coming up to the D.F. board. Before they came to blows however, they carried out a thorough examination of the wiring all the way from the main distribution board in the engine room, up to the bridge. And when at length they reached the chartroom they found that the mains supply had been wired through the chartroom door switch that automatically switched off



The most disastrous result that can follow from inadequate use of radar is collision at sea. The above vessel was declared a total constructive loss following a collision with another vessel. Fortunately there were no injuries or deaths.

the chartroom lights when the door was opened so as to preserve the blackout. In daylight hours, and in warm weather, bridge personnel had hooked the chartroom door open, thus breaking the circuit to the charging board. It should never have been wired through that switch, but it was.

BUILT–IN IMMUNITY

Echo sounders, oddly enough, seem to have a builtin immunity to casual abuse of the kind with which we are concerned here, possibly because they are such self-contained units, whirring away contentedly and drawing their little pictures of soundings. They seem to have their own builtin immunity, so the principal navigational aids to suffer are radar and D.F.

There is, however, another installation, not navigational, but still likely to be vital to safety at sea, which is frequently maltreated and sometimes, regrettably, deliberately so. This is the intercom, which some seamen appear to regard as a species of "big brother" apparatus and resent as an intrusion. Here it is usually the loudspeaker in the crew's quarters that gets the unwelcome attention, although sometimes the wires leading to it are "accidentally" severed. Volume-control knobs are occasionally twisted right off; socks or sweatrags stuffed inside; or occasionally the downright drastic surgery of a knife through the cone has been resorted to, generally as the outcome of a dispute between one man who wants to listen to a program while another wants to sleep.

That such measures should be adopted points to both stupidity and ignorance. The damaged loudspeaker might, in an emergency, be the only means of calling men from watch below to fight a fire or even to abandon ship. And there is absolutely no need to "kill" a loudspeaker in this way. In any modern intercom system individual volume controls can be turned right down or completely off but urgent orders and communications from the bridge will still come through, because of the master override facility incorporated to bypass controls in the off position.

There, then, are a few examples of what can happen, and does happen, to vitally important equipment. There may be many more, unrecorded but just as real, and just as dangerous. If this article should inspire just one reader to form his own unofficial SPAR—Society for the Prevention of Abuse to Radar—the writing of it has been well worth while. ⚓

ARIZONA-MEIKO MARU COLLISION

The National Transportation Safety Board and the Commandant have announced their Actions on the Marine Board of Investigation convened to investigate the collision of the SS *Arizona* and Japanese MV *Meiko Maru* with loss of life on 2 August 1965.

NATIONAL TRANSPORTATION SAFETY BOARD'S ACTION

This accident was investigated by the U.S. Coast Guard under the authority of R.S. 4450 (46 U.S.C. 239) and the regulations prescribed by 46 CFR 136. The Marine Board of Investigation was conducted in a public proceeding in Portland, Oreg., beginning 27 September 1965. The Board also reviewed and entered into the record exhibits from a Maritime Accident Inquiry Court convened at Yokohama, Japan, on 19 May 1966. No representatives of the Coast Guard participated in the proceedings of the Japanese Maritime Accident Inquiry Court.

The Coast Guard report of the investigation of the accident and the commandant's action thereon is included in and made a part of this report for the convenience of the public. By publication of this report, the National Transportation Safety Board does not adopt portions of the Coast Guard report which are concerned with activities within the exclusive jurisdiction of the Department of Transportation and the Coast Guard.

The Department of Transportation Act, effective April 1, 1967, assigned the responsibility to the National Transportation Safety Board for determining the cause of transportation accidents, and reporting the facts, conditions, and circumstances related to such accidents. Accordingly, the Board has considered those facts in the Coast Guard report of this accident investigation pertinent to its statutory responsibility to make a determination of cause.

The National Transportation Safety Board finds that the cause of the accident was excessive speed used by the master of the SS *Arizona* and the immoderate speed used by the master of the *Meiko Maru*.

Neither master slowed his vessel to a moderate speed under conditions of dense fog and the darkness of night in a heavily trafficked area, and neither stopped and navigated with caution when the fog signal of another vessel was reported forward of the beam and the position not ascertained.

The masters of both vessels were navigating by radar to the exclusion of the Rules of the Road and the requirements of good seamanship. Neither was properly utilizing the radar to best advantage by plotting the relative motion of the targets. Radar properly used as an aid can contribute greatly to safe navigation. However, as illustrated so dynamically in this accident, failure to employ radar properly can lead to disaster.

The Safety Board further concludes that the master of the SS *Arizona* had ample reasons to believe that the collision was with another vessel and that his failure to initiate an immediate search for survivors, in accordance with the traditions of the sea, may have caused the death, by drowning, of possible survivors.

By the National Transportation Safety Board:
December 29, 1967

/s/ JOSEPH J. O'CONNELL, Jr., *Chairman.*
/s/ OSCAR M. LAUREL, *Member.*
/s/ JOHN H. REED, *Member.*
/s/ LOUIS M. THAYER, *Member.*
/s/ FRANCIS H. McADAMS, *Member.*

The capsized hull of the Meiko Maru *is towed back to port and tended to by workers.*

COMMANDANT'S ACTION

The record of the Marine Board of Investigation convened to investigate subject casualty has been reviewed and the record, including the Findings of Fact, Conclusions and Recommendations, is approved subject to the final determination of the cause of the casualty by the National Transportation Safety Board and the following comments.

Reliance upon radar in periods of reduced visibility in areas of heavy traffic to the exclusion of the statutory Rules of the Road and the Radar Annex to those Rules cannot be condoned.

The recommendations in the Radar Annex clearly caution the prudent mariner that the statutory requirement for proceeding at a moderate speed may mean that where there are "radar indications of one or more vessels in the vicinity, 'moderate speed' should be slower than a mariner without radar might consider moderate under the circumstances."

REMARKS

The mariner who fails to properly utilize radar can expect to be held accountable for this failure in the same manner as for any other neglect or disregard of the requirements of good seamanship. This proper utilization may in certain instances call for plotting targets, analyzing the information and taking prompt, early and positive action as recommended in the Radar Annex to the International Rules of the Road.

W. J. Smith,
Admiral, U.S. Coast Guard,
Commandant.

21 November 1967.

FINDINGS OF FACT

At approximately 0209, 2 August 1965, the SS *Arizona,* O.N. 266534 outbound from Yokohama, Japan, on the high seas and in an approximate position; lat. 34°43.5′N., long. 139°13.8′E., collided with a then unidentified vessel incurring structural damage to her stem and forebody estimated to amount to $173,167. At approximately the same time and in the same vicinity, the Japanese M/S *Meiko Maru* bound from Yokkaichi to Chiba, Japan, was in collision with a then unidentified vessel which sheared off and sank the stern section and capsized the forebody of the *Meiko Maru,* resulting in one surviving, injured, crewmember and apparent loss of lives of the remaining 18 crewmembers of the *Meiko Maru.*

VESSEL DATA

	Arizona	*Meiko Maru*
Name		
Official number	266534	86824.
Nationality	United States	Japan.
Trade	Mariner-type ocean cargo.	Coastal bulk tankship.
Gross tons	12,711	995.
Net tons	7,564	
Length	563.6 feet	68.38 meters.
Breadth	76.3 feet	10.2 meters.
Draft (approx.)	24 feet 5 inches forward, 28 feet 8 inches aft.	
Propulsion	Geared turbine	Diesel.
Horsepower	17,500	1,150.
Home port	San Francisco, Calif.	Yokohama, Japan.
Built	1953	1961.
Owners/operators	States SS Corp. San Francisco, Calif.	Meiwa Kaiun Kabushiki. Kaisha, Yokohama, Japan.
Last inspection	22 Jan. 1965 Portland, Oreg.	Unknown.
Master	H. G. Sorensen	Hiromitsu Sakachi.

Sueyoshi Machida, 1770 Naneki-cho, Set agaya-Ku otohyo, Japanese citizen, age 43, the second mate and deck officer on watch aboard the *Meiko Maru* is the sole known survivor, and was injured. Exhibit 9 lists the identity of the remaining 18 crewmembers who are either dead or missing and presumed to be dead. There were no injuries to crewmembers of the SS *Arizona*.

The weather at the time of the casualty was described as smooth sea, light airs and a dark night. Visibility was poor because of fog and had been getting worse. Estimates of visibility ranges from zero at the time of collision to several hundred yards at times prior to collision. Official Japanese weather bureau reports, exhibit 59, indicate dense fog for the period. Tide tables, Yokohama Reference Station, indicate low slack water at 0157 LZT. The tide was flooding at the time of the collision. H.O. 95 Sailing Directions for Japan, vol. II, states that at time of flood, current sets WSW, dominating the opposing ocean current of 1-knot average for August. The force of the WSW current is not stated.

The *Arizona* was equipped with a Raytheon Mariner Pathfinder Radar having a 16-inch scope with range scales of 1 mile, 2 miles, 8 miles, 20 miles and 40 miles. This radar has a gyrorepeater bearing circle for true bearings and relative motion. The chassis is fitted with a collapsible canvas blackout hood and is located to starboard and slightly abaft the steering stand in the wheelhouse. Captain Henry Sorensen was the sole operator of the radar and was stationed at the set during the greater part of the period leading up to and surrounding the collision. No graphical plot of targets was being made. The radar was reported in excellent operating condition.

The MS *Meiko Maru* was equipped with a Japanese radar having an estimated 10-inch scope, equipped with range scales of 1 mile, 3 miles, 15 miles and 30 miles, a fixed relative bearing circle and movable bearing cursor for relative motion presentation. At times leading up to and surrounding the collision, Captain Hiromitsu Sakachi was the sole operator of the radar, which at collision was set on the 3-mile scale (photograph 9, exhibit 60).

The SS *Arizona* departed from the port of Yokohama, Japan, at 2242 LZT. A Japanese pilot was employed leaving the harbor area. He departed from the vessel at 2326 LZT. The vessel's sailing draft was logged as 28 feet 4 inches aft and 25 feet 4 inches forward. The midnight weather log entries indicate visibility was 8 miles with a calm sea. Under "Course" the bridge logbook indicates "master conning." At 2400 LZT, departure was taken from Kannon Saki Light bearing 324° True, with a radar range of 2 miles. At this time the engines were placed on full ahead with an engine speed referred to as "14 nozzles." The Third Mate, Jack C. Davis, relieved the watch at approximately midnight. Numerous small fishing vessels were observed during this watch. Lights ashore were visible during the watch and the shoreline was clearly discernible by the master on radar. At 0032 LZT the vessel's speed was increased from 14 nozzles to 18 nozzles and at 0033 LZT Captain Sorensen fixed the vessel position by radar range as approximately 4 miles off Joga Shima Light. Prior to this Sorensen had observed by radar that a large ship was approximately 1,500 feet abaft of the *Arizona's* starboard beam. The *Arizona* at this time was on course 230° True. Approximately 10 minutes later, Sorensen estimated by radar observation that this large vessel was a mile away and proceeding in the same direction. Sometime during the next hour Sorensen hauled the *Arizona's* course slightly left to 220° True, as the large vessel on the starboard side seemed to be on a slightly converging course and was gradually overtaking the *Arizona*.

The bow lookout, Henry Hahn, Z–222061, reported a navigation light visible on the port bow, which the master identified as Oshima Light. By radar it was determined to be 5 miles away. At 0147 LZT this same light was abeam to port 115° visually, at a radar range of 4 miles. The course made good from the departure fix at 0033 LZT to the 0147 LZT was 228°. The speed was 17.9 knots.

Testimony from witnesses indicates that at this time visibility was closing in, particularly on the port side. One witness described it as "patches of fog." Fog signals were being sounded every 2 minutes by the *Arizona* using the automatic timer.

Close-up of the Arizona's *bow indicates damage sustained from her contact with the* Meiko Maru.

Captain Sorensen stated that at 0148 LZT he again ordered a change of course to the left at 210° True, to avoid the overtaking ship on his starboard beam. The gyro course recorder trace does not bear out this statement, as 220° is the recorded base course. Sorensen continued to conn his vessel by radar navigation. Except for momentary switching to 1-mile, 2-mile, and 20-mile scales, the radar was left on the 8-mile scale according to Sorensen and was on the 8-mile scale at collision. The mate on watch acted as a lookout and handled the various administrative duties on the bridge. Captain Sorensen occasionally left the radar scope to make whatever visual or audio observations that were possible.

At 0209 LZT, while the *Arizona* was proceeding at over 17 knots on a course of 220° True, a collision occurred. Captain Sorensen rang full astern and after satisfying himself that way was off the vessel he rang stop and sounded the general alarm. The noise and force of the collision was not great and opinion on the bridge was that they might have collided with one of the many small wooden fishing vessels that frequented the area. This opinion was partially based on the alleged lack of any nearby radar targets ahead of the *Arizona*.

The position of the *Arizona* was fixed by radar at 0220 as lat. 34°43.5′ N., long. 139°13.8′ E. By comparison of this position with his recollection of the radar picture at the time of collision, Sorensen believed that the vessel's position had not substantially changed since collision.

H. G. Sorensen stated that at no time did he observe on radar a pip indicating the other vessel with which the *Arizona* collided, either before, at the time of collision or subsequently.

The lookout, Henry Hahn, Z–222061, stationed on the forecastle head heard a whistle signal estimated at approximately two points quite a distance off the starboard bow. He did not note the time but estimates it to have been around 0130 LZT. He immediately reported the signal to the bridge by telephone and it was acknowledged by Captain Sorensen and interpreted by radar as being an overtaking vessel approximately 1 mile on his starboard beam. No other fog signals were heard and no lights from then on were seen ahead until Hahn observed two lights suddenly loom up out of the fog, dead ahead and immediately thereafter the collision occurred. He did not recall the color or relative position of the lights but believed if they had been other than white he would have recalled it. The suddenness of their appearance caused Hahn to be scared and to jump back. Hahn believed they had struck a fishing boat and reported this to the bridge by telephone and that he had observed debris on the forecastle head consisting of broken bits of red glass and what appeared to be wire antennas and insulators. At daybreak, after the collision, a large section of debris was observed below the waterline which seemed to be fouled on the vessel's forefoot. It appeared to be metal plating and a large turnbuckle attached to a large diameter piece of wire similar to a mast shroud. When this was reported to the master, he backed the vessel down and the debris fell clear.

The helmsman, Norman Carlson, Z–1145801–D1, recalls that he was steering course 220°, that the rudder was amidship at the time of collision but that the ship's head fell off rapidly to the left following collision from 220° to 150°.

Immediately following the collision, deck lights were turned on, the general alarm was sounded, and the crew was mustered at their stations. The ship's searchlight was

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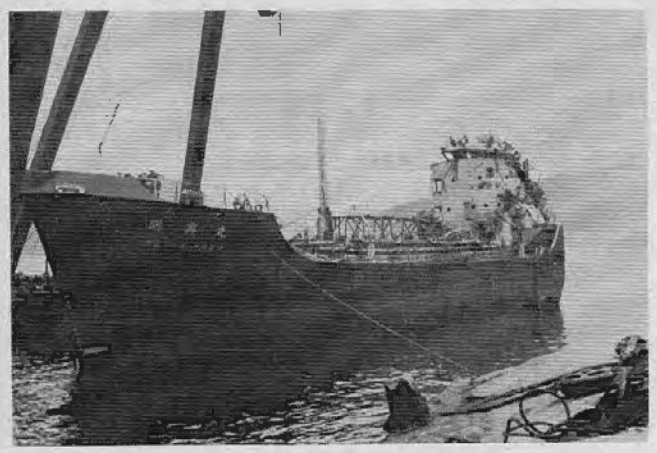


Missing her after section, which was not recovered, the Meiko Maru *is refloated.*

also manned. The master ran to the starboard bridge wing and looked over the side. He saw nothing but did note that although the engines were going full astern, the ship still had a way on. Shortly thereafter and by the time the deck floodlights were turned on, the *Arizona* was dead in the water. The master went forward and examined the bow of his ship. At that time there did not appear to be any damage other than some long scratches on both sides of the stem at the 24-foot waterline of the *Arizona*. The *Arizona* remained in this area until 1831 LZT, 2 August 1965, underway with no way on in dense fog. Search was limited to use of the vessel's searchlight.

In the meantime, the radio operator of the SS *Arizona* listened in vain for any distress messages from the other vessel. At 0240 LZT the master of the *Arizona* contacted the Japanese Maritime Safety Bureau and reported a collision with an unknown object during fog. They in turn requested the *Arizona* remain in the area of the collision. At 0535 LZT, in response to a request from the Japanese Maritime Safety Agency, the master of the *Arizona* advised that visibility was zero with intermittent fog. The *Arizona* remained in the area of the collision until excused by the Japanese patrol vessel at 1231 LZT, 2 August, when she resumed her voyage to Subic Bay. However, a short time later upon request by the Japanese Government, the *Arizona* returned to Yokohama to assist in the investigation by the Japanese Government.

Evidence of the navigation of the M.S. *Meiko Maru* is limited to the testimony of Sueyoshi Machida, the second mate on watch and sole surviving crewmember, and post-salvage photographs and survey report of the *Meiko Maru* furnished by the Japanese Marine Accident Inquiry Court. The *Meiko Maru* departed in ballast from the port of Yokkaichi, Japan, at 1400 LZT, 1 August 1965 bound for Chiba, Japan. Machida, in his first statement given on 3 August 1965, testified that he stood watch from 0000–0400 with Boatswain Kenichiro Tokaji and deckhand Kunio Kaminaka. Upon reporting to the bridge, Kaminaka took over the wheel and Tokaji stood at his right. The master, Hiromitsu Sakachi, remained on watch at the conn, scanning the radar which was located abaft and to port of the wheel. Machida stationed himself at the center open bridge window as lookout. The vessel was on full speed, approximately 10 knots. Machida had no knowledge of the vessel's course and was not informed of it by the master. He believed the radar to be on 3-mile range and the master remained constantly at radar and sounded fog signals. He heard fog signals ahead several times and reported them to the master. A collision occurred suddenly at about 0300 LZT throwing him overboard and rendering him unconscious. At the time this statement was given, Machida was hospitalized, suffering from injuries sustained in the collision, and complained of a headache.

On 10 August 1965, Machida continued his statement and offered the following refinements. He reported at the bridge at 2345 LZT, 1 August. The master ordered Machida to keep a sharp lookout. Courses had previously been plotted on the chart by the master. At 0000 LZT the master fixed the *Meiko Maru* position by radar, bearings of Mikomoto Shima, Irozaki and Tsumekisaki. Course was believed to be 50°. Weather was dense fog, visibility 50 meters. The master sounded fog signals at intervals of approximately 3 or 4 minutes. He didn't know what scale the radar was on. Visibility became much worse. Machida heard a fog signal 30° to 35° on port bow and reported it to the master who then ordered 5° starboard. 15 minutes later he reported a fog signal from another vessel abeam and master ordered 10° starboard change. No other signals were heard during the watch. 10 to 20 minutes later the master suddenly ordered "starboard", Machida went to port wing, heard the master order "hard starboard" and simultaneously saw the bow of another vessel running over the *Meiko Maru*. Collision time was not ascertained. Machida corrected his testimony on *Meiko Maru*'s speed to that of half speed, 7 or 8 knots, when he relieved watch and 20 minutes later rang slow, 5 knots, on master's order. Machida had no knowledge of the vessel's navigation situation and considered the master should have taken emergency action, either gaining or reducing speed, to avoid collision.

In a third statement taken on 14 August 1965, Machida further refined his previous statements to the effect that the master at about 0000 LZT hours plotted the vessel's position and when Machida glanced at the chart the

Meiko Maru was on course line N. 50° E., 3 miles southeast of Mikomoto Shima, that the *Meiko Maru* was then half speed, 7 to 8 knots, that he heard the fog signals 30° to 35° port bow at 0140 LZT hours, that since relieving the watch he, Machida, did not check the chart on which the master marked vessel's position.

In his fourth statement taken on 5 September 1966, Machida further refined previous statements in that he described seeing the telegraph on half speed when coming on watch. That the master called him to the chartroom from his position of lookout and showed him chart No. 80 with the vessel's plotted position, that after 1 hour 30 minutes he reported a fog signal 30° to port and course was changed to N. 55° E., that 5 minutes later course resumed, that 10 minutes later another whistle signal was reported and course changed 10° starboard, that 3 minutes later course N. 50° E. resumed, that 15 minutes later the master ordered starboard followed by collision within a minute, that the helmsman was desperately turning the wheel, that he estimates the *Meiko Maru's* bow to have swung as much as 30° to starboard, that no telegraph was rung during his watch, and that he places the collision at about 0200 LZT.

The second mate Machida, was knocked off his feet by the force of the collision. When he recovered consciousness, he was floating in the sea. He was rescued some 10 hours later.

Post salvage photographs of the *Meiko Maru* show the following conditions: radar switches on AC100V with scale switch set at 3 miles; ship's clock stopped at approximately 0209 LZT; wheelhouse telegraph handle off of the scale at full astern and engineroom response indicator off the dial at full ahead; engineroom answering telegraph handle broken and on half astern, bridge pointer on line between dead slow astern and finished with engine; wheelhouse steering stand rudder indicator at hard right. Telegraph cables were severed and torn adrift by collision.

Photographs also show the forebody of the *Meiko Maru* floating capsized when discovered. Salvage photos show the hull is indented commencing at the main deck fashion plate port side and the stern section is sheared off immediately aft of the engineroom forward bulkhead. The concave rounded indentation extends into and to the top of the superstructure in the vicinity of the port bridge wing. This indentation at the level of superstructure top penetrates nearly to the vessel's centerline. From that point the line of shear tends generally aft and to starboard. The missing stern section comprises the main engineroom, machinery spaces, crew accommodations, and stores. The stern section is not known to have been recovered. The Board has received no information on the cost of the material damage to the *Meiko Maru.*

Chemical and physical tests of paint samples taken from the SS *Arizona* and the MS *Meiko Maru* after collision were conducted by the Japanese Police Scientific Investigation Department at the direction of the Yokohama Maritime Safety Agency.

William B. Slater, employed as third mate aboard the SS *Arizona* and who holds a license as master, stated that he stood the 2000–2400 watch prior to collision. He had turned in but was awakened by a slight bump or jar from the collision. That very shortly thereafter the general alarm rang while he was getting dressed. Arriving on the bridge, the first thing he did was to glance at the radar scope. He observed on both port and starboard sides a considerable number of small pips which he interpreted to be fishermen. None of these pips were very close to the

Workmen survey damage to the Meiko Maru *at the point where she was sheared in two by the* Arizona's *bow.*

Arizona. On the starboard bow were pips of two large vessels and abaft the starboard beam, also well clear of the *Arizona*, was another pip which Slater interpreted to be another oceangoing vessel.

Original form CG–2692 and forms 924E (total 18) were forwarded by OCMI, Seattle letter 5943 dated 7 July 1966.

CONCLUSIONS

From the above facts it is concluded that:

a. The SS *Arizona* and the M/V *Meiko Maru* were in collision at 0209 (−9 ZD) on 2 August 1965, on the high seas in the vicinity of Oshima Island, Japan. The approximate position was lat. 34°43.5′N., long. 139°13.8′ E. The indent in the *Meiko Maru* conforms generally to the configuration and damage markings on the bow of the SS *Arizona*. Paint sample comparison, Exhibit 58, indicates intermingling of hull paint from the *Arizona* and *Meiko Maru*. Foreign debris found on the bow of the *Arizona* immediately following collision resembles material from the *Meiko Maru*. Evidence of time and position from both the *Arizona* and *Meiko Maru* place them in collision.

b. There were no injuries of any consequence to any crewmember of the *Arizona*. Eighteen of the nineteen crewmen of the *Meiko Maru* were killed or are still missing and presumed dead. The sole survivor of the *Meiko Maru* suffered injuries that required hospitalization for an unknown period of time, but estimated to be at least 6 months. The concentration of crewmembers of the *Meiko Maru* within an area bounded by the damage perimeter and the lack of any warning contributed to the high loss of life aboard that vessel.

c. Prior to collision radar targets and observed fog signals from other vessels were not positively identified as to course and speed by any semblance of navigational plot made by either the *Arizona* or *Meiko Maru*. Captain Sorensen of the *Arizona* and Captain Sakachi of the *Meiko Maru* were the only persons having knowledge of radar presentation leading up to and surrounding collision. Evidence points to neither master having undue concern for radar targets they observed until in the jaws of collision and then only by Captain Sakachi who apparently had observed the target of the *Arizona* and just prior to ordering "hard starboard" had anticipated collision. The alleged failure of Captain Sorensen to detect the *Meiko Maru* on radar is concluded to have resulted from human error, in that he dismissed a fog signal properly reported by the lookout as coming from the starboard bow, and erroneously concluded it to have been the signal of a vessel on his starboard beam, which he had observed on radar. Since small fishing vessels and another vessel 2,000 yards to starboard were readily detected it must be assumed that the radar was functioning properly and would have shown this target on the corresponding range scale. The radar was apparently on 8-mile range setting most of the time for the 30–40 minute period prior to the collision to maintain surveillance of vessels to starboard. The closing speeds of the two meeting vessels would put the *Meiko Maru* on the 8-mile scope for approximately 15–20 minutes. A short lapse of alertness by Captain Sorensen at this critical point would account for his failure to detect or interpret a target as being the *Meiko Maru*.

d. The base course of the *Arizona* was the approximate reciprocal of the base course of the *Meiko Maru* and that the two vessels were nearly head and head except during periods of minor course adjustments by each vessel. That the minor course adjustments were of little significance by reason of the failure to maintain radar plot; that failure to employ radar to its best advantage by either vessel, particularly as related to range scales used for speeds of vessels and traffic conditions involved, contributed to the collision.

e. That the speed of 17 knots or better by the *Arizona* was excessive for the conditions of visibility and was a major cause of collision.

f. That the *Meiko Maru* was most probably making a speed of 10 knots. This is concluded from the first testimony of the sole survivor and the apparent dynamic force of the collision which swung the bow of the *Arizona* to port 70°, notwithstanding her rudder being amidship and completely severed the *Meiko Maru*. This speed is also concluded to have been immoderate and a major cause of collision.

g. That the force of the collision capsized the forebody of the *Meiko Maru*, rolling it under the keel of the *Arizona* and severed and sank the stern section of the *Meiko Maru*.

h. That the angle of collision was about 70° measured from the bow aft on the port side of the *Meiko Maru*.

i. That the visibility leading up to and surrounding the time of collision was near zero, and that both vessels had been navigating in dense fog, the *Arizona* for at least 15 minutes prior to collision and the *Meiko Maru* for at least an hour.

j. That there is no evidence of malfunctions of machinery or any navigational equipment on either the *Arizona* or *Meiko Maru*.

k. That both the SS *Arizona* and MS *Meiko Maru*, having heard forward of their beam the fog signal of another vessel the position of which was not ascertained, neglected to stop and navigate with caution.

(Continued on page 81)

The new 378-foot U.S. Coast Guard Cutter *Hamilton*, arriving for a week's visit in the Nation's Capital, in May of 1967 follows an escort boat up the Potomac River toward Washington, D.C., where she held open house.

U.S. COAST GUARD 1967

H. R. Kaplan

FOR THE U.S. Coast Guard, 1967 will go down as a busy year in which it helped fight the sea war against the communist enemy in Vietnam while carrying out its traditional role as guardian of life and property at sea.

This was the Coast Guard's first year as an agency of the Department of Transportation. Joining the newly-formed Department on April 1, 1967, after having been in the Treasury Department organization since 1790, the Coast Guard looks forward to participating in the new Department's united effort to improve the Nation's land, sea, and air transportation facilities.

VIETNAM

In 1967 the Coast Guard reinforced its coastal surveillance of South Vietnamese waters by dispatching five 311-foot oceangoing cutters to this area. Known as Squadron 3, the new force supplements the activity of the twenty-six 82-foot cutters which have been on patrol duty in southeast Asia since July, 1965. Squadron 3 has its headquarters in Subic Bay, Republic of the Philippines.

In its more than 2 years of activity in Vietnam, the Coast Guard has made an impressive record. While taking part in Operation Market Time, the service has inspected and boarded over 252,000 junks, taken into custody 226 suspicious looking native craft and 4,188 persons suspected of assisting the enemy. Cutters on patrol duty have provided gunfire support for allied forces ashore and have often shot it out with enemy craft. One hundred nineteen Viet Cong craft have been destroyed, including steel-hulled vessels heavily laden with materials destined for the war fronts.

The larger cutters of Squadron 3 have put more muscle into the Coast Guard's sea arm in Vietnam and extended surveillance much farther offshore than is possible for the 82-foot cutters.

Besides maintaining coastal surveillance, the Coast Guard in Vietnam carries out port safety functions, handles merchant marine personnel problems, supervises the loading of explosives and other dangerous cargoes, and maintains aids to navigation. Nearly 1,500 Coast Guardsmen are

now on duty in Vietnam out of a total service enrollment of 36,000.

MARITIME SAFETY

Along with the war in Vietnam, the Coast Guard last year continued to wage unceasing war to reduce hazards to life and property at sea. Since danger at sea never takes a holiday, this war is fought the year round on a 24-hour basis.

As the principal U.S. agency for promoting safety at sea, the Coast Guard maintains a diversified maritime safety program designed to (*a*) prevent disasters at sea from happening, and (*b*) to carry out quick and effective search and rescue operations when they do happen.

Cornerstone of the preventative safety program is the Coast Guard's intensive vessel inspection system, under which every U.S. vessel subject to the inspection laws is placed under scrutiny from the blueprint stage throughout its operating life. This system has helped make the U.S. merchant marine the world's safest. In 1967 the Coast Guard inspection program involved some 9,259 commercial vessels.

SEARCH AND RESCUE

Search and rescue is a major function of the Coast Guard, and the ships, aircraft, and small boats of the service were well-occupied during fiscal year 1967 as they responded to calls for assistance in 42,000 instances. During that 12-month period, the Coast Guard estimates that it saved more than 3,000 lives while assisting nearly 127,000 persons. The value of property involved in these rescue operations totaled some $2,859,698,000.

Contributing to the search and rescue effort is the Coast Guard's Automated Merchant Vessel Reporting System (AMVER), which—through its computer center in New York City—plotted the location of some 1,000 ships in the Atlantic Ocean and 800 in the Pacific each day during fiscal year 1967. This pinpointing of precise ship locations assists the Coast Guard in providing the fastest possible response when disaster strikes on the high seas.

BOATING SAFETY

Coast Guard concern for safety on the water includes the millions of recreational craft filling our waterways in growing numbers. This mission is entrusted largely to the Boating Safety Division, which last year carried out a program of safety education and law enforcement. Under authority of the Federal Boating Act of 1958, the Coast Guard entered into agreements with 10 States for law enforcement and patrolling of regattas. Forty mobile boarding units were employed throughout the country for safety patrols, examination of boats, and public safety education. It is anticipated that mobile boarding units will be substantially increased in the coming years.

During the year, about 1,400 Coast Guard boats were employed in boating safety activity over a wide area. Assisting the Boating Safety Division was the Coast Guard Auxiliary, a volunteer organization of pleasure boatmen dedicated to promoting safe boating practices through an extensive program of safety education courses.

DISASTER RELIEF

Misfortune strikes not only at sea but sometimes on land, as in the Brownsville area of Texas, which was ravaged by the vicious hurricane Beulah. In its 3 days of fury, the storm did enormous damage to property and exacted loss of life. Heavy rains accompanying Beulah flooded the Rio Grande. Working on a round-the-clock basis, Coast Guard helicopters evacuated hundreds of men, women, and children from the stricken areas. Food and water were airlifted to the flooded sections, and every available Coast Guard helicopter was pressed into service. The rescuers' work was harassed by tornadoes and a drenching downpour, but because of the efforts of the Coast Guard and other military services and private agencies, the human toll was comparatively light.

OIL POLLUTION

The American people were shocked into recognition of the oil pollution danger by the grounding of the giant tanker *Torrey Canyon*, which caused heavy pollution of English and French coastlines. Public concern was so widespread that President Johnson directed that a joint study be undertaken by the Departments of Interior and Transportation in cooperation with other Government agencies to determine the extent of the danger along the United States' extended coastline. Authorities were especially concerned with the more than 100 tankers sunk off the U.S. seaboard during World War II and their potential for creating pollution dangers.

At the direction of Secretary of Transportation Alan S. Boyd, the Coast Guard undertook to investigate possible pollution hazards in four sunken tankers along the Atlantic seaboard. Results to date indicate that the vessels do not pose any pollution threats, but the investigation will have to be continued on a wider scale before any final conclusions can be reached.

The Coast Guard is currently pursuing an active program to provide adequate safeguards for protecting the American public against a *Torrey Canyon*-type disaster. Considerable effort is also being expended to effect a significant reduction in the overall pollution of American waterways.

MARINE SCIENCE

Reflecting the growing national interest in the ocean sciences, the Coast Guard last year accelerated its marine research program. The high-endurance cutter *Rockaway* was converted into an oceanographic vessel, and a contract was awarded for the design

of a specially equipped marine research vessel. The new 378-foot Coast Guard cutters *Hamilton* and *Dallas* can perform many marine science functions in addition to their primary missions. The new cutters feature fully instrumental wet and dry oceanographic laboratories and meteorological facilities.

In 1966 five icebreakers were transferred to the Coast Guard from the Navy, and 1967 was the first year that the Coast Guard operated the entire national icebreaker fleet. In the summer of 1967 Coast Guard icebreakers participated extensively in polar operations. During that period the *Northwind*, while on a resupply mission in the western Arctic, made the farthest penetration of that region ever accomplished by an American surface vessel before being compelled by ice conditions to turn back. At the bottom of the world, in the Antarctic, Coast Guard vessels continued to participate in Operation Deepfreeze, a scientific study of Antarctica.

The International Ice Patrol, which the Coast Guard has been operating since 1914 in the North Atlantic to protect shipping against floating ice hazards, continued the Coast Guard's long-range program of collecting data on the phenomena of northern waters.

Disaster Relief—U.S. Coast Guardsman Clarence D. Cook lifts 3-year-old Margurita Dela Cruz into a helicopter rescuing hurricane Beulah victims 10 miles from Matamoros, Mexico, last September 1967.

SERVICE MODERNIZATION

Plans for replacing the Coast Guard's aging fleet went ahead briskly in 1967. Two of its new class of 378-foot high-endurance cutters, *Hamilton* and *Dallas*, were commissioned. Others launched in the past year included the *Mellon, Chase, Sherman, Boutwell,* and the *Gallatin.* They are the largest Coast Guard fleet units.

Two new 210-foot medium-endurance cutters were commissioned and four were launched, bringing the total number of 210-footers in service to seven, with nine others in various stages of construction.

1967 was also an important year for Coast Guard aviation. Amphibious turbine-powered helicopters replaced the last of the piston-powered machines at Air Station Traverse City, Mich. To assure the effectiveness of the Coast Guard's worldwide Loran systems, the Coast Guard accepted delivery of a specially equipped calibration aircraft to replace the overage C–54 formerly used to monitor system performance. In the coming year, the Coast Guard looks forward to delivery of the first of several twin-turbine amphibious helicopters. These advanced aircraft will greatly extend the range of the Coast Guard's rescue capability at sea. A new air station planned for construction at Cape May, N.J., in 1968 will substantially improve coverage of the heavy recreational boating area, including Delaware and upper Chesapeake Bay.

NEW INITIATIVES

The interagency-sponsored study on the feasibility of national data buoy systems was completed this year. This worldwide data collection system, using unmanned buoys moored in deep ocean and continental shelf areas, is expected to meet national needs for oceanographic and meteorological data. Results of the study indicate that this system could be developed in approximately 5 years. Accordingly, the Coast Guard is preparing for further exploratory and advanced development during 1968.

The Coast Guard, under the general guidance of the Marine Science Council, has a developmental program to explore new and useful fields

(Continued on page 82)

DECK

Q. A vessel loads gasoline with a coefficient of expansion of .0006 per degree Fahrenheit. The cargo temperature at time of loading is 50° F. and the maximum cargo temperature on the voyage is 80° F. How much of the capacity of an 8000-barrel tank would you leave empty to allow for expansion during the voyage?

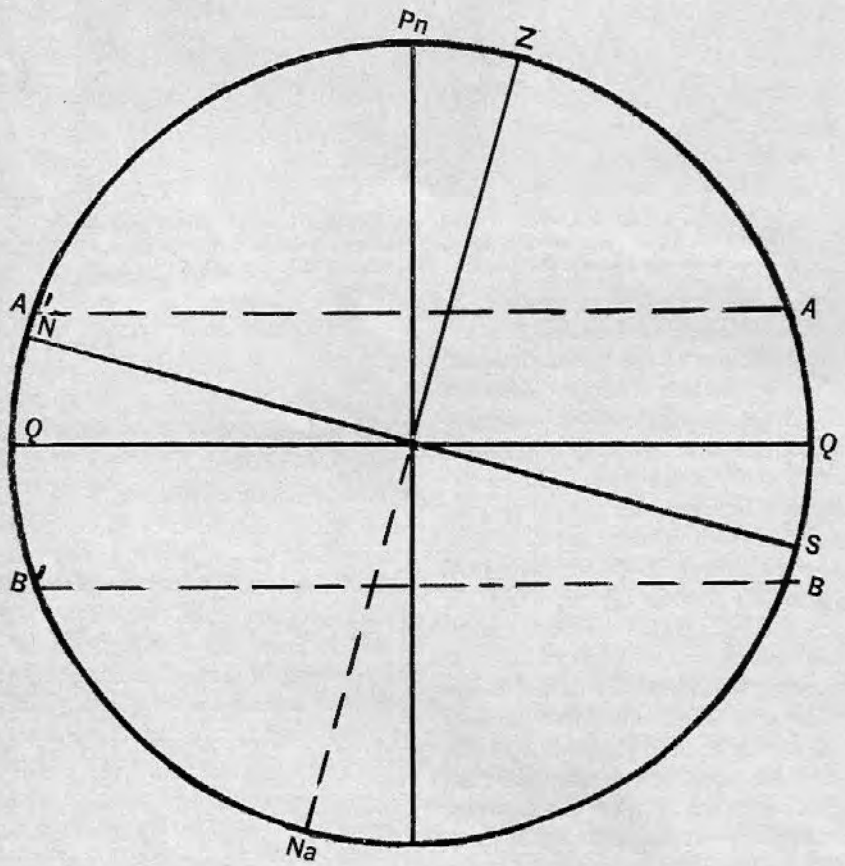
A. $.0006 \times (80° - 50°) = .0180$
$.0180 \times 8000 = 144$ barrels to be allowed for expansion.

NAUTICAL ASTRONOMY

Q. (a) Referring to the diagram on the plane of the meridian, if an observer was at latitude 75° North and the sun was at 20° North, declination, as indicated by the dotted line *AA'*, what would the length of daylight be?

(b) If the sun was at 20° South declination, as indicated by the dotted line *BB'*, what would be the length of daylight?

(c) What would be the maximum altitude of the sun and where would the maximum altitude appear on the sketch?



A. (a) 24 hours
(b) 0 hours
(c) 35° at position *A*

ENGINE

Q. (a) Where does the greatest wear occur on the cylinder liner of most diesel engines? Why?

(b) What would you do to keep this wear to a minimum?

A. (a) The greatest wear on the cylinder liners usually occurs near the highest point of travel of the top piston ring. This point is the hardest to keep lubricated due to the extreme pressures and temperatures encountered. Friction is high at this point also, due to the changing of speed and direction at the end of the stroke.

(b) To minimize this wear the liners should be periodically inspected to insure that the proper lubrication is being received and that the rings are functioning properly. Good grades of fuel and lubricating oils should be used and the air as well as the oils should be properly cleaned of all abrasive materials.

Q. Compartments containing lead acid storage batteries must have adequate ventilation because:

(a) Hydrogen gas is generated by the batteries
(b) Acid fumes would be poisonous
(c) It prolongs the battery life
(d) None of the above

A. (a) Hydrogen gas is generated by the batteries

Q. A "cofferdam" is:

(a) A narrow deep tank.

(b) A longitudinal tank adjacent to a vessel's shell.

(c) Another name for lazarette.

(d) A spare-parts locker of the engineroom.

(e) An empty space separating two adjacent compartments.

A. (e) An empty space separating two adjacent compartments.

ARIZONA—MEIKO MARU

(*Continued from page 76*)

l. That all personnel on watch on both vessels properly executed all duties assigned to them by their respective masters who were exercising conn.

m. That Captain Sorensen admittedly was away from the radar at times between 0147 and 0204 LZT for the purpose of listening to fog signals and discussing this with the mate Mr. Davis; that he repositioned himself at the radar at about 0204 LZT and concentrated his attentions on a target which he placed at 1.1 miles on his starboard side, during which period collision with the undetected *Meiko Maru* was imminent.

n. That the *Arizona* proceeded for as much as 1 mile beyond the point of collision before coming to a stop and drifting; that no subsequent engine maneuvers were made until 0410 when maneuvers were made due to other vessels' close approach as indicated on radar and that an effective search for wreckage or possible survivors of this collision was not conducted by the *Arizona*.

o. Captain Sorensen and Third Mate Davis deny having seen any target on radar which could have been the *Meiko Maru* before, during, or after collision, however, Third Mate William B. Slater, upon arriving on the bridge following collision states he observed several small pips on radar interpreted as fishing vessels on both port and starboard sides and two large pips on the starboard bow interpreted as large vessels. The Board accepts the testimony of Slater as being most reliable and concludes that one of the pips interpreted as being a fishing vessel could have been the capsized low freeboard hulk of the *Meiko Maru*.

p. The failure of Captain Sorensen and Captain Sakachi to proceed at moderate speed under conditions of dense fog and extremely reduced visibility in a heavily trafficked area constitutes evidence of negligence.

q. That there is no evidence that any personnel of the Coast Guard or any other Government agency contributed to this casualty.

RECOMMENDATIONS

1. Based on the above findings the Board recommended further investigation under the provision of R.S. 4450 in the matter of License No. 292 119 held by Henry G. Sorensen.

2. The Board recommends that a copy of this report be furnished to the U.S. Department of State for further transmittal to the Japanese Government.

3. The Board further recommends that no other action be taken and the case be closed. ⚓

AMENDMENTS TO REGULATIONS

Title 46 Changes

SUBCHAPTER D—TANK VESSELS

SUBCHAPTER I—CARGO AND MISCELLANEOUS VESSELS

PERSONNEL EXPOSURE PROTECTION IN LIFESAVING EQUIPMENT AND EMERGENCY ELECTRICAL POWER FOR RADIOTELEPHONES ON GREAT LAKES TANK AND CARGO VESSELS

Pursuant to the notice of proposed rule making published in the FEDERAL REGISTER of November 17, 1967 (32 F.R. 15835–15837), and Merchant Marine Council Public Hearing Agenda (CG–249, Volume III), the Merchant Marine Council held a public hearing on December 4, 1967, for the purpose of receiving comments, views, and data. Item PH 33–67 (32 F.R. 15836), contained proposals regarding personnel exposure protection in lifesaving equipment on Great Lakes tank and cargo vessels. Item PH 34–67 (32 F.R. 15836) contained proposals regarding emergency electrical power for radiotelephone on Great Lakes tank and cargo vessels. Interested persons have been afforded an opportunity to participate in the consideration of these proposals.

With respect to Item PH 33–67, regarding personnel exposure protection in lifesaving equipment, oral comments and four written comments were received. The comments requesting clarification of application of 46 CFR 33.05–20(c) are accepted and the wording revised to show it applies to tankships of 300 gross tons and over in Great Lakes service. The Merchant Marine Council's actions with respect to comments received are approved. The proposals, as amended, are adopted and set forth in this document.

Oral comments and 10 written comments were received regarding Item PH 34–67, emergency electrical power for radiotelephones on Great Lakes tank and cargo vessels. This proposal, after consideration of the comments received, is withdrawn and actions deferred until the regulations referred to in "The Agreement for the Promotion of Safety on the Great Lakes by Means of Radio," between the Governments of United States and Canada, are amended to require an auxiliary source of energy for the radiotelephone. The comments indicate that many operators of Great Lakes vessels had already installed radiotelephones utilizing an emergency source of power that would meet the intent, if not the substance, of the proposed regulations. Certain comments requested permission to continue these installations for a reasonable period of time. It was also pointed out that these proposed regulations would only be a stop gap measure until the regulations to the Great Lakes Agreement

are amended. The Merchant Marine Council's actions with respect to comments received and its recommendations are approved.

The complete text of these changes has been published in the Federal Register of February 10, 1968.

STORES AND SUPPLIES

Articles of ships' stores and supplies certificated and canceled from January 23, 1968 to February 29, 1968, inclusive, for use on board vessels in accordance with the provisions of part 147 of the regulations governing "Explosives or Other Dangerous Articles on Board Vessels" are as follows:

CERTIFIED

Pilot Chemicals, Inc., 860 West 44th St., Norfolk, Va., 23508; Certificate No. 775, PILOT FOTX; Certificate No. 776, PILOT CARBON SOLVENT; Certificate No. 777, PILOT 129–E, DEGREASER; Certificate No. 778, PILOT OIL SPILL ERADICATOR (OSE); Certificate No. 779, PILOT SHIPSHAPE; Certificate No. 780, PILOT PHOSPHO; Certificate No. 781, PILOT X–200; Certificate No. 782, PILOT TANK WASH; Certificate No. 783, PILOT PROCOSOL #1; Certificate No. 784, PILOT PROCOSOL #2, all dated January 23, 1968.

Marine and Ship Supply, Inc., 110 Brannan St., San Francisco, Calif., 94107: Certificate No. 785 dated January 30, 1968, NYSTOL #75 LIQUID CLEANZIT; Certificate No. 786, dated January 30, 1968, NYSTOL #76 POWDERED DESCALER; Certificate No. 790, dated February 14, 1968, NYSTOL #74 RUST REMOVER.

Bull & Roberts, Inc., 785 Central Ave., Murray Hill, N.J., 07971: Certificate No. 787, dated January 30, 1968, BROMAR HEAVY DUTY ALKALINE CLEANER; Certificate No. 788, dated February 6, 1968, BROMAR EMULSIFYING DEGREASER; Certificate No. 789, dated February 6, 1968, BROMAR TANK CLEANER.

Diamond Alkali Co., Division Technical Center, Post Office Box 191, Painesville, Ohio 44077: Certificate No. 601, dated July 14, 1964, DIAMOND ONE-ONE-ONE TRICHLOROETHANE.

CANCELED

Allright Chemical Co., 870 Riverside Drive, New York, N.Y., 10032: Certificate No. 307, dated April 7, 1950, SPRAYWONDER.

Crosbie-Bamert, Inc., 1717 Fourth St., Berkeley, Calif., 94710: Certificate No. 639, dated February 8, 1966, HYDRO-PURGE #16.

Eastburn Marine Chemical Co., Inc., 53 Abbett Ave., Morristown, N.J., 07960: Certificate No. 576, dated October 23, 1963, EASTBURN 230 (VELVOLINE); Certificate No. 577, dated October 23, 1963, EASTBURN 337 (ECONO SLOSH); Certificate No. 578, dated October 23, 1963, EASTBURN 234 (CHALLENGER TYPE CLEANER); Certificate 589, dated January 6, 1964, EASTBURN 212 (ECCOTERJ); Certificate No. 590, dated January 6, 1964, EASTBURN 233 (SEA MULSION); Certificate No. 591, dated January 6, 1964, EASTBURN 225 (RUST RETARD); Certificate No. 592, dated January 6, 1964, EASTBURN 353 (CLEARSOL #2); Certificate No. 593, dated January 6, 1964, EASTBURN 306 (WATTSENE #2).

Kerns Industries, 9734 Klingerman St., South El Monte, Calif. 91733: Certificate No. 689, dated September 19, 1966, KERNS MARINE GLOW.

Klenzoid Corp., 4041 Ridge Ave., Philadelphia, Pa. 19129: Certificate No. 388, dated, June 5, 1959, KLENZOID FUEL OIL STABILIZER.

Solarine Co., 4201 Pulaski Highway, Baltimore, Md. 21224: Certificate No. 104, dated May 7, 1953, SOLARINE LIQUID METAL POLISH.

Star Industries, Inc., 22 Peen. Ave., Kearny, N.J. 07032: Certificate No. 690, MARLINE 55; Certificate No. 691, MARLINE 100; Certificate No. 692, MARLINE 110; Certificate No. 693, MARLINE 120; Certificate No. 694, MARLINE 227; Certificate No. 695, MARLINE 245; Certificate No. 696, MARLINE DBTC, all dated September 27, 1966.

Affidavits

The following affidavits were accepted during the period from January 15, 1968, to February 15, 1968:

M. Greenberg's Sons, Inc., 765 Folsom St., San Francisco, Calif. 94107, VALVES, FITTINGS and FLANGES.

Rockwell-Brodie Co., Post Office Box 450, Stateshoro, Ga. 30458, VALVES.

NOTE: Delete footnote 36 on page 73 of CG–190 for Republic Mfg. Co. Substitute footnote 36 for 37 for Resistoflex Corp. Delete footnote 37 at the bottom of page 73. The above corrections will be made in the revised edition of CG–190.

COAST GUARD

(*Continued from page 79*)

in undersea safety and search and rescue, including accompanying legislative proposals. The Coast Guard has proposed that we take positive steps now to insure the safe and orderly development of activities on our continental shelf and under the sea.

A recent study, jointly prepared by the Coast Guard and the FAA, concludes that, with the establishment of the Department of Transportation and the existence within that Department of the two agencies responsible for Federal aids to navigation programs, an opportunity exists to produce a unified national plan for navigation. The plan would contain recommendations for U.S. national policy and support programs for development, implementation and operation of federal aids to navigation.

It was a crowded year for a service which will celebrate its 178th birthday next August 4. Time has evidently not impaired its vigor or its relish for new experiences. And that is exactly the way the Coast Guard wants it. ⚓

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 Sunday, Monday, and days following 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 may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Subscription rate is $1.50 per month or $15 per year, payable in advance. Individual copies may be purchased so long as they are available. The charge for individual copies of the Federal Register varies in proportion to the size of the issue but will be 15 cents unless otherwise noted in the table of changes below. Regulations for Dangerous Cargoes, 46 CFR 146 and 147 (Subchapter N), dated January 1, 1968, are now available from the Superintendent of Documents, price: $2.50.

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 (8–1–62).
115	Marine Engineering Regulations and Material Specifications (3–1–66). F.R. 12–6–66, 12–20–67.
123	Rules and Regulations for Tank Vessels (5–2–66). F.R. 12–6–66, 12–9–67, 12–27–67, 1–26–68, 1–27–68, 2–10–68.
129	Proceedings of the Merchant Marine Council (Monthly).
169	Rules of the Road—International—Inland (9–1–65). F.R. 12–8–65, 12–22–65, 2–5–66, 3–15–66, 7–30–66, 8–2–66, 9–7–66, 10–22–66, 12–23–67.
172	Rules of the Road—Great Lakes (9–1–66).
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 (3–1–65).
176	Load Line Regulations (1–3–66). F.R. 12–6–66, 1–6–67, 9–27–67.
182	Specimen Examinations for Merchant Marine Engineer Licenses (7–1–63).
184	Rules of the Road—Western Rivers (9–1–66). F.R. 9–7–66, 12–23–67.
190	Equipment Lists (8–1–66). F.R. 9–8–66, 11–18–66, 2–9–67, 6–6–67, 6–14–67, 6–30–67, 8–29–67, 10–7–67.
191	Rules and Regulations for Licensing and Certificating of Merchant Marine Personnel (2–1–65). F.R. 2–13–65, 8–21–65, 3–17–66, 10–22–66, 12–6–66, 12–13–66, 6–1–67, 11–16–67.
200	Marine Investigation Regulations and Suspension and Revocation Proceedings (5–1–67).
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 (3–1–67). F.R. 3–29–67, 12–23–67.
249	Merchant Marine Council Public Hearing Agenda (Annually).
256	Rules and Regulations for Passenger Vessels (5–2–66). F.R. 12–6–66, 1–13–67, 4–25–67, 8–29–67, 12–20–67, 1–27–68.
257	Rules and Regulations for Cargo and Miscellaneous Vessels (1–3–66). F.R. 4–16–66, 12–6–66, 1–13–67, 12–9–67, 1–26–68, 1–27–68, 2–10–68.
258	Rules and Regulations for Uninspected Vessels (3–1–67). F.R. 12–27–67, 1–27–68.
259	Electrical Engineering Regulations (3–1–67). F.R. 12–20–67, 12–27–67, 1–27–68.
266	Rules and Regulations for Bulk Grain Cargoes (11–1–66).
268	Rules and Regulations for Manning of Vessels (5–1–67).
270	Rules and Regulations for Marine Engineering Installations Contracted for Prior to July 1, 1935 (11–19–52). F.R. 12–5–53, 12–28–55, 6–20–59, 3–17–60, 9–8–65.
293	Miscellaneous Electrical Equipment List (4–1–66).
320	Rules and Regulations for Artificial Islands and Fixed Structures on the Outer Continental Shelf (10–1–59). F.R. 10–25–60, 11–3–61, 4–10–62, 4–24–63, 10–27–64, 8–9–66.
323	Rules and Regulations for Small Passenger Vessels (Under 100 Gross Tons) (1–3–66). F.R. 12–6–66, 1–13–67, 12–27–67, 1–27–68.
329	Fire Fighting Manual for Tank Vessels (4–1–58).

CHANGES PUBLISHED DURING FEBRUARY 1968

The following have been modified by Federal Register:
CG–123, and CG–257, Federal Register, February 10, 1968.

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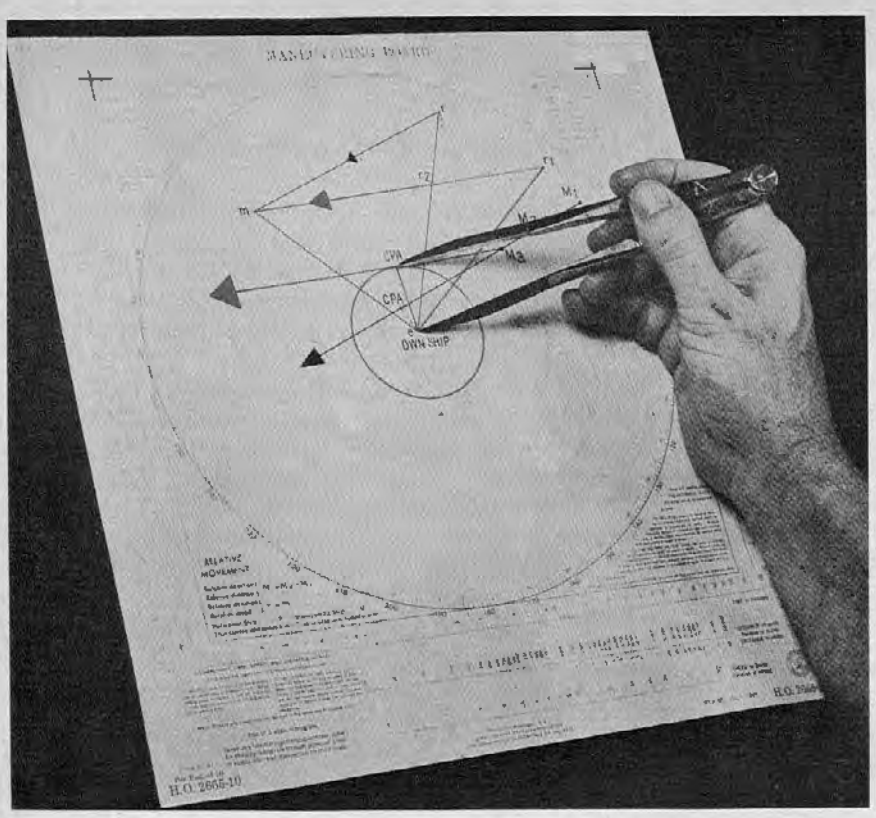

Radar information can be extremely valuable to the master, but it is useless and may even cause confusion if it is not properly interpreted. The importance of plotting cannot be overemphasized, for the plot is the basic tool in rendering radar information coherent. Plotting is a technique which should be consistently practiced, particularly in periods of low visibility. It could mean the difference between a safe voyage and collision at sea.

Illustrated here is a radar plot of two vessels meeting, with own vessel to pass astern of the other vessel. Master of own vessel plans to change course, yet maintain speed, so that the closest point of approach (CPA) will be 2½ miles instead of 1 mile. The plot determines the new course as shown by er_1.

The Rules of the Road advise the master of his responsibilities in the use of radar. Reprinted below is the Annex to the Rules, containing this information.

RECOMMENDATIONS ON THE USE OF RADAR INFORMATION AS AN AID TO AVOIDING COLLISIONS AT SEA

(1) Assumptions made on scanty information may be dangerous and should be avoided.

(2) A vessel navigating with the aid of radar in restricted visibility must, in compliance with Rule 16 (a), go at a moderate speed. Information obtained from the use of radar is one of the circumstances to be taken into account when determining moderate speed. In this regard it must be recognized that small vessels, small icebergs and similar floating objects may not be detected by radar. Radar indications of one or more vessels in the vicinity may mean that "moderate speed" should be slower than a mariner without radar might consider moderate in the circumstances.

(3) When navigating in restricted visibility the radar range and bearing alone do not constitute ascertainment of the position of the other vessel under Rule 16(b) sufficiently to relieve a vessel of the duty to stop her engines and navigate with caution when a fog signal is heard forward of the beam.

(4) When action has been taken under Rule 16(c) to avoid a close quarters situation, it is essential to make sure that such action is having the desired effect. Alterations of course or speed or both are matters as to which the mariner must be guided by the circumstances of the case.

(5) Alteration of course alone may be the most effective action to avoid close quarters provided that:—

(a) There is sufficient sea room.

(b) It is made in good time.

(c) It is substantial. A succession of small alterations of course should be avoided.

(d) It does not result in a close quarters situation with other vessels.

(6) The direction of an alteration of course is a matter in which the mariner must be guided by the circumstances of the case. An alteration to starboard, particularly when vessels are approaching apparently on opposite or nearly opposite courses, is generally preferable to an alteration to port.

(7) An alteration of speed, either alone or in conjunction with an alteration of course, should be substantial. A number of small alterations of speed should be avoided.

(8) If a close quarters situation is imminent, the most prudent action may be to take all way off the vessel.