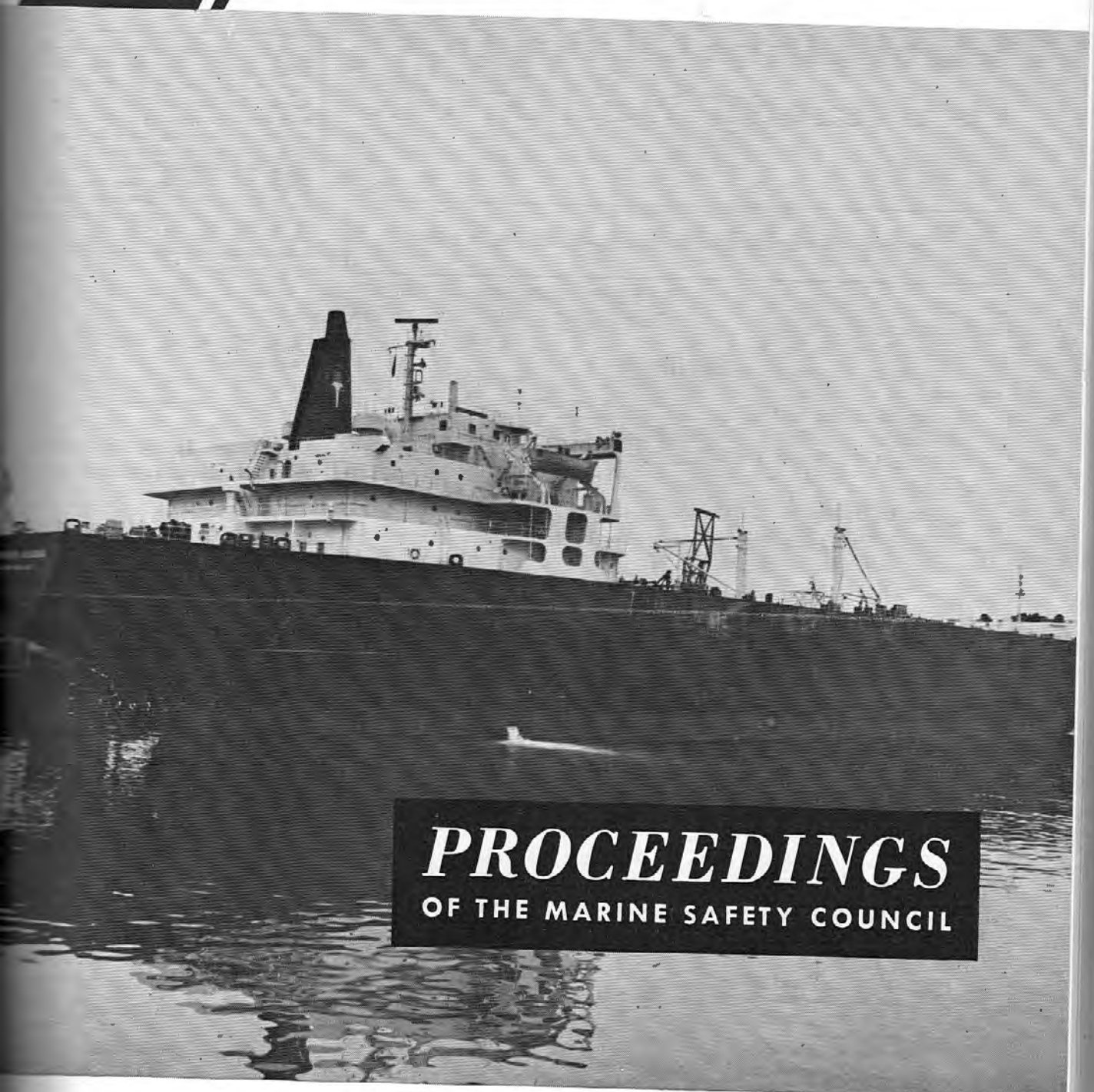
COAST GUARD



PROCEEDINGS

OF THE MARINE SAFETY COUNCIL

Vol. 28, No. 7 CG-129 July 1971

PROCEEDINGS
OF THE
MARINE SAFETY COUNCIL

IN THIS ISSUE . . .

Interpreting Marine Radar . . .

Selected Marine Collisions From Fiscal Years 1957–59 and 1967–69 . . .

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CONTENTS

COVERS

FRONT COVER: The S/T Overseas Alaska is shown discharging the last of her half million barrel cargo at Chevron, Perth Amboy, prior to sailing for the first time from her home port. Built at Bethlehem Steel Corp.'s Sparrows Point Yard, owned by Overseas Corp., the 731 foot, 62,005 dwt vessel is a single-screw turbine reduction gear-drive tanker receiving the highest rating from the American Bureau of Shipping. *Courtesy Tow Line, Moran Towing, and Transportation Co., Inc.*

BACK COVER: Comparisons of collision statistics from the late fifties and the late sixties (contained in this issue) should suggest several areas where vessel safety procedures could be followed more closely.

DIST. (SDL No. 93)
A: abcdew(2); fghijklmnopqrstuv(1)
B: n(40); c(16); e(5); f(4); gh(3); bkijnq(1)
C: abcdefgimnou(1)
D: i(5); abdeklmnsuvx(1)
E: d(1)
F: kjp(1)
Lists 141M, CG–13, CG–20

Relative Motion vs. *True Track Plotting*

INTERPRETING MARINE RADAR

Jack Pansmith, President
Pansmith Navigational Devices

Articles have been printed in previous issues of the Proceedings *describing relative motion methods of plotting information obtained from radar. The author of this article presents his views on plotting the same information by the true motion (or true track) method instead of by the relative motion method. His views are presented not to endorse them but to bring them to mariners for their thoughtful consideration. The Coast Guard feels that consideration and evaluation of any method designed to prevent collisions at sea can only lead to better understanding of the problems involved and tend to lessen the occurrence of such collisions—Editor.*

THE NEED TO PLOT AND INTERPRET RADAR DATA

RADAR GIVES the bearing and distance off of objects shown on the radar screen at the *instant of observation.* It does not give a history of past events. A single inspection of the radar screen at any one instant cannot be used by itself to analyse a situation. It is necessary to make a plot of the movements or nonmovements of the data derived from the scope at timed intervals. This plot must be depicted in a manner that will present a *visual picture* which can be rapidly and clearly interpreted. For anticollision purposes, the plot must: (1) show which contacts may become problems; and (2) serve as a basis of a solution for appropriate evasive action.

PRESENT MANUAL "RELATIVE MOTION" PLOTTING TECHNIQUES

Since the advent of radar for shipboard use, the "'relative motion" plotting technique has been the accepted method taught by all U.S. authorities—Bowditch, Dutton, H.O. Maneuvering Board Manual, H.O. Radar Plotting Manual, Marad's Radar Manual, and others. That it is confusing, ambiguous, and subject to misinterpretation, is shown by the fact that a True Plot is usually employed to explain the "relative motion plot."

Over the past 25 years, many officers and radar experts have proposed various methods to make it more understandable. Thayer, Hengst, Peterson, Oliver, Brown, Slack, Wylie, Burger, Oudet, Fonda, Lubin, and others, all contributed suggestions to clarify the "relative motion plot."

The fact remains, it is *not* understandable to most officers and *is* very difficult to interpret. To quote from the U.S. National Transportation Safety Board Report on collisions of Radar-Equipped Merchant Ships: "Based on the analysis of all the tabulated collisions was a *lack of understanding of relative motion.*" (Italics supplied.)

Mr. Jack Pansmith is president of Pansmith, Inc., Hauppauge, N.Y., 11787, Manufacturers of Navigational Devices, member of the Institute of Navigation, Navigator in the U.S. Power Squadron and member of the Radio Technical Committee for Marine Services on Radar and Radar Plotting.

THE CASE AGAINST "RELATIVE MOTION" RADAR PLOTTING

"Relative motion" radar plotting techniques require the observer to form a mental picture in his mind's eye of the *past* and *developing* situation to determine evasive action to prevent a collision. Unless you are a "Dunninger" mindreader, this is practically impossible.

As an illustration—Contacts that move from dead ahead, or almost so, toward your position at the center of the relative motion plot, *can* mean:

(1) a ship is heading directly toward you, *OR*
(2) a ship is going away from you, *OR*
(3) a ship or object is stopped or motionless (see contacts F, G, H of Relative Motion Plot *Figures* 2 and 3).

If a contact is going astern from the center of the plot, it *may* mean the ship is going in a forward direction *NOT* astern (see contact D).

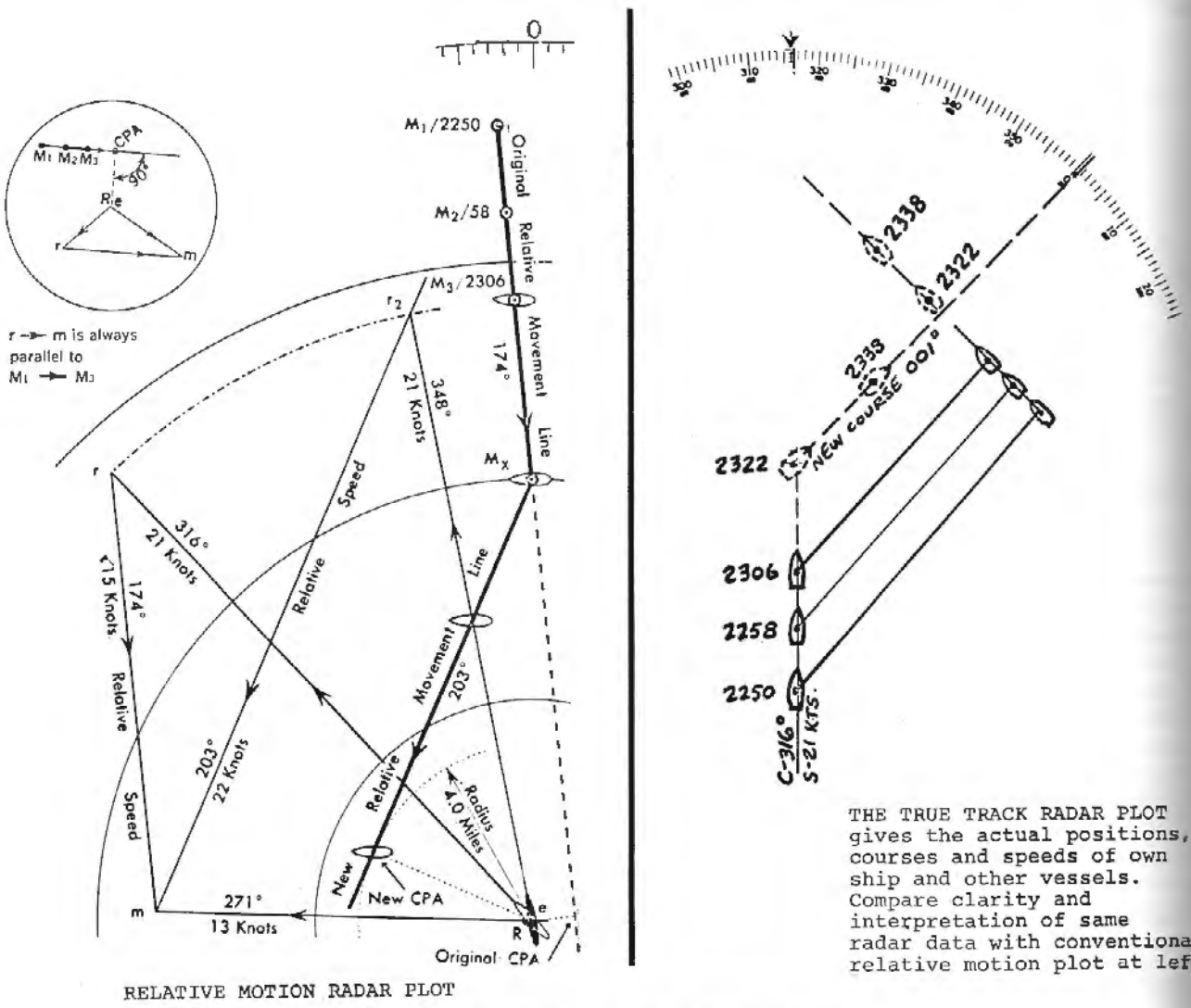

Figure 1.—Comparison of Relative Motion and True Motion Plots of single ship encounter.

A *motionless* pip means a ship is moving on a parallel course at same speed as your ship (see contact C).

Also, two scales usually are necessary, one to determine speed and the other for distance; often they are confused.

How can an officer be expected to *mentally* interpret these situations correctly and take appropriate evasive action, particularly if any ship on the plot changes course or speed?

We must conclude: The Relative Motion Radar Plotting Technique is AMBIGUOUS, CONFUSING, VISUALLY UNDECIPHERABLE, TIME CONSUMING, ARCHAIC, AND OBSOLETE and has been a causal factor in many collisions.

"PASSIVE KNOWLEDGE WITHOUT ACTIVE AWARENESS"—Sir Robert Watson-Watt.

THE "TRUE TRACK," GE… GRAPHICAL OR NAVIGA… TIONAL RADAR PLOTTIN… TECHNIQUE

The TRUE TRACK PLO… creates a chart of a part of the earth's surface and a *measure* of that pa… of the earth. The true plot gives t… *actual* distance and direction … movement to ONE selected scale.

If either *own* ship or contac…

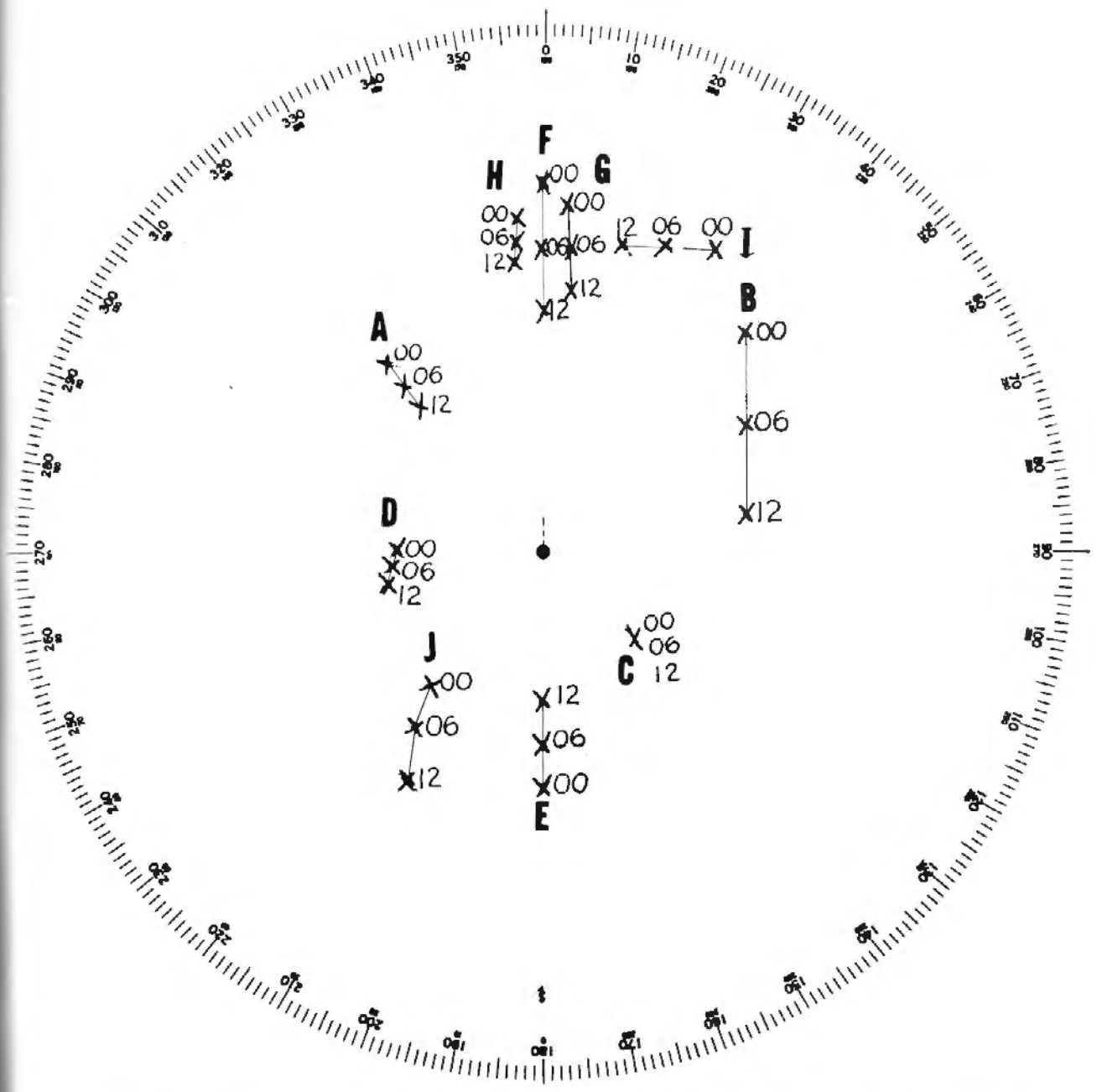

Figure 2.—Relative Motion Plot made with grease pencil on scope. Radar on 10 mile range. Own Ship Course—000°. Speed—10.0 knots.

change course and/or speed since the previous observation, the actual positions will be indicated on the true plot at the *instant* of the next observation. It provides continuous tracking of all ships in real time. With the new True Track method, the plot of the situation is constructed in seconds. It utilizes the essential information readily available from *any* marine radar regardless of make or age—that is: the TRUE BEARING AND RANGE OF AN OBJECT, AT THE INSTANT OF OBSERVATION.

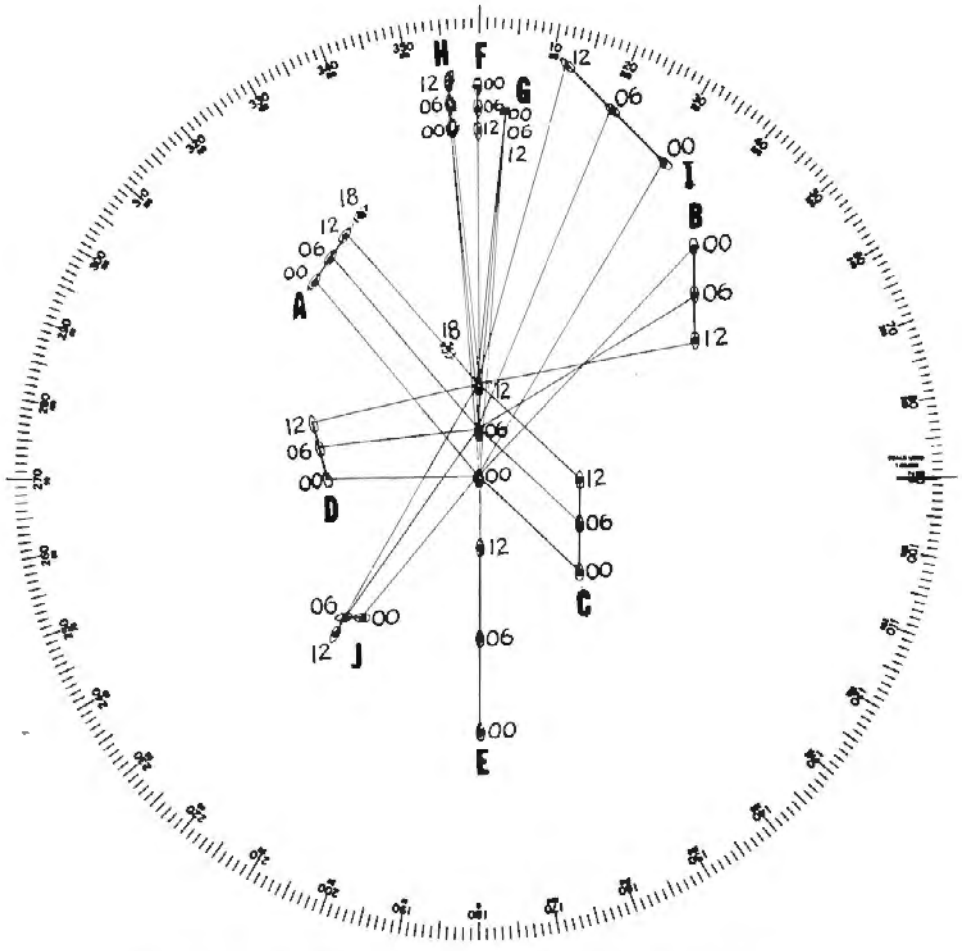

Figure 3.—Tr... Track Plot ma... on perma... reusable plott... sheet with or... nary lead penc... Same situation ... in Figure 2.

TYPICAL ANALYSIS OF THE TRUE-TRACK RADAR PLOT

SYMBOLS: = Own Ship = Other Ship = Projected Positions

Ships A, E, F	— Bearing Lines are parallel and ranges decreasing	=	Collision Risk
Ship B	— Bearing Lines are crossed	=	Passing Situation (check ranges)
Ship C	— Bearing Lines are parallel *but range* is constant	=	Other ship on parallel course on same heading and speed
Ship D	— Bearing Lines opening aft	=	Own ship passing ahead
Ship E	— Bearing constant dead astern with ranges decreasing	=	Other ship is overtaking on collision course
Ship F	— Bearing constant dead ahead ranges decreasing	=	Head-on collision risk
Ship G	— Bearings plot at same point	=	Fixed object (ship at anchor buoy, etc.)
Ship H	— Bearing Lines practically parallel ranges decreasing	=	Own ship overtaking — Assess risk of collision
Ship I	— Bearing Line opening forward	=	Other ship passing ahead
Ship J	— Bearing Lines are random	=	Other ship changing course.

Because it presents a graphically clear picture, the measures necessary to prevent a collision are readily discernible and can be interpreted even by unskilled personnel.

LET US COMPARE THE TWO METHODS

Figure 1 shows a relative motion plot and a true track plot of the same simple ship encounter. Which is more intelligible?

Figure 2 shows 12 ship contacts plotted with the relative motion method on a reflectoscope surface with a grease pencil. Can it be *readily* interpreted? If radar range scale is changed or any ship changes course or speed, the plot becomes confused and ambiguous. To determine course, speed and CPA of each contact requires additional tedious and time-consuming operations. The triangular vectors that must be constructed would make this plot an undecipherable maze.

Figure 3 is the true track plot of the same multiple ship situation as shown in Figure 2. It presents a picture as it would appear to the eye in clear weather. Any ship's change of course or speed can be readily detected and the radar range scale can be switched at any time without necessitating a change in the plot scale.

Which plot would you prefer to interpret and evaluate, if you were called upon to make a quick decision for evasive action to prevent a collision with any *one* or *all* ships shown?

TO SUMMARIZE THE ADVANTAGES OF THE TRUE TRACK RADAR PLOT

(1) A manual plotter is available, designed, and instrumented to provide instantaneous analysis of courses, speeds, and collision risks of multiple contacts from the ranges and bearings shown on the radar screen. With a specially designed parallel rule, the true bearing and range of any radar contact can be recorded in *SECONDS* on the plotting sheet.

(2) Courses of all contacts can be determined in *SECONDS* with the same parallel rule.

(3) A template, provided for measuring the length of course lines, gives the distance traveled and the speed is determined from a supplied Time-Speed-Distance table. At the same time, the template is used to draw the silhouette aspect of all ships. This operation can be performed in *SECONDS*.

(4) The CPA for any contact also may be extracted in *SECONDS* from the True Plot. However, if own ship or other ships change course or speed, the CPA is worthless and, in our opinion, can lead to a false sense of security, particularly if it shows a safe clearance which is subject to change at any instant.

(5) By analysing the lines of bearing in *Figure* 3, note how the situation is readily apparent *by eye*.

(6) The True Plot can be used to establish a permanent record on the Plotter's base of any blind sectors caused by obstructions in the line of the antenna scanner.

(7) The True Plot, when made to the scale of the chart in use, may be overlayed on the chart to fix the ship's position and show any navigational hazards that might influence evasive action. This may be accomplished on the bridge without loss of night vision, illumination being supplied by red light.

The author invites comments and discussions of this article—either concurring or contrary views. ⚓

Court Decision On Unseaworthiness

The U.S. Supreme Court dealt with a case involving the difference between negligence of an individual and unseaworthiness of equipment in a January decision.

A longshoreman had been injured by a loading sling lowered "too far and too fast" by a winch operator. The court said that "neither before or after this occurrence was any difficulty experienced with the winch, boom, fall, sling, or any other equipment or appurtenances of the ship or its cargo." The worker sought compensation and brought suit under the doctrine of unseaworthiness.

The decision stated that—

> A major burden of the Court's decisions spelling out the nature and scope of the cause of action for unseaworthiness has been insistence upon the point that it is a remedy separate from, independent of, and additional to other claims against the shipowner, whether created by statute or under general maritime law. More specifically, the Court has repeatedly taken pains to point out that liability based upon unseaworthiness is wholly distinct from liability based upon negligence. The reason, of course, is that unseaworthiness is a condition, and how that condition came into being—whether by negligence or otherwise — is quite irrelevant to the owner's liability for personal injuries resulting from it.

Finally the Court concluded:

> What caused the petitioner's injuries in the present case, however, was *not* the condition of the ship, her appurtenances, her cargo or her crew, but the isolated, personal negligent act of the petitioner's fellow longshoreman. To hold that this individual act of negligence rendered the ship unseaworthy would be to subvert the fundamental distinction between unseaworthiness and negligence that we have so painstakingly and repeatedly emphasized in our decisions. ⚓

A COMPARATIVE VIEW COLLISIONS FROM FISCAL YEARS

A major statistical study of selected marine collisions in the late fifties and late sixties was completed by the Coast Guard's Office of Merchant Marine Safety earlier this year.

The two time periods chosen for comparison were the entire fiscal years of 1957, 1958, and 1959 and those of 1967, 1968, and 1969. Although every attempt was made to standardize the information available from reports of marine casualties during these periods, several unavoidable limitations persisted. Perhaps most important for purposes of comparison between the two periods was the widespread lack of full information in the basic reports.

In addition casualties studied were limited to those occurring within the Coast Guard's jurisdiction and further limited by the exclusion of collisions occurring on the Western Rivers, above Baton Rouge, La.

A total of 199 collisions were considered from fiscal years 1957, 1958, and 1959 and 218 collisions were studied from fiscal years 1967, 1968, and 1969.

Figure 1, illustrates the comparison between the two time periods in terms of the number of collisions occurring at different times of the year. With an overall increase of 9.5 percent, there were specific increases of larger amounts in the months of November, February, April, May, and June. Collisions increased only 3 percent during the winter months of October through March, but jumped an appreciable 19 percent during the remainder of the year. Similar weather conditions prevailed in enough of the comparative collisions so as to affect the results only incidentally. Although no high degree of correlation appeared to exist between month of occurrence and number of collisions, there did appear to be some seasonal variation.

COMPARISON OF COLLISIONS BY MONTH/SEASON OF OCCURRENCE

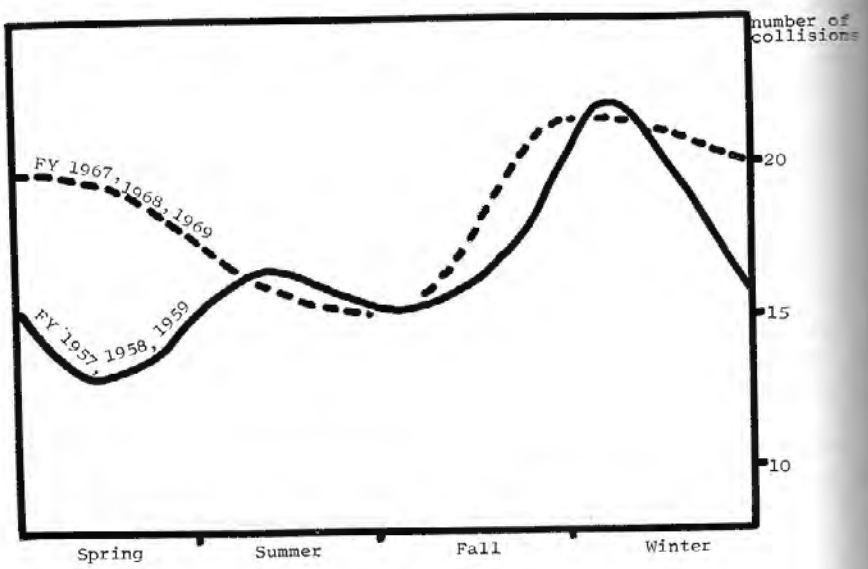

Figure 1

OF SELECTED MARINE YEARS 1957–59 AND FISCAL 1967–69

COMPARISON OF COLLISIONS BY LOCAL HOUR OF OCCURRENCE

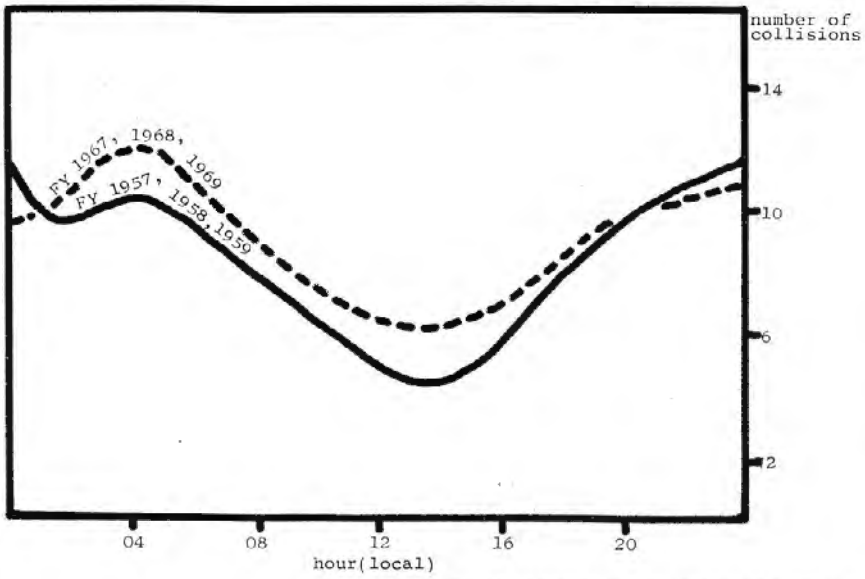

Figure 2

Figure 2, illustrates data obtained on the number of collisions reported during each hour of the day. In isolated instances during the hours of darkness, there were substantial increases in the number of collisions from the fifties to the sixties. One statistic remained relatively constant during both periods—over 50 percent of the collisions occurred in the 10 hours from 2000 through 0500 local time.

Figure 3, contains information on the change in number of collisions involving two U.S. vessels, a U.S. vessel and a foreign vessel, and two foreign vessels. U.S./foreign collisions increased by well over 50 percent while U.S./U.S. collisions decreased by about the same amount. Foreign/foreign collisions remained constant.

COMPARISON OF COLLISIONS BETWEEN FOREIGN AND U.S. VESSELS

	United States/ United States	Foreign/ United States	Foreign/ Foreign
FY 1957, 1958,1959	104	85	10
FY 1967, 1968,1969	69	139	10

(number of collisions)

Figure 3

427-294—71—2

COLLISIONS AS A FUNCTION OF TONNAGE

OVER 10,000 (with)

	under 1,000	1-5,000	5-10,000	over 10,000
FY 1957, 1958, 1959	21	14	11	8
FY 1967, 1968, 1969	59	5	23	14

5,000 - 10,000 (with)

	under 1,000	1-5,000	5-10,000	over 10,000
FY 1957, 1958, 1958	45	12	12	11
FY 1967, 1968, 1969	47	6	21	23

1,000 - 5,000 (with)

	under 1,000	1-5,000	5-10,000	over 10,000
FY 1957, 1958, 1959	31	9	12	14
FY 1967, 1968, 1969	23	2	6	5

UNDER 1,000 (with)

	under 1,000	1-5,000	5-10,000	over 10,000
FY 1957, 1958, 1959	36	31	45	21
FY 1967, 1968, 1969	12	23	47	59

Figure 4

Figure 4, indicates a decrease of approximately 25 percent in the total number of collisions occurring between vessels of the same size and a similar increase in the collisions between vessels of different sizes. The "UNDER 1,000" category continued through both periods to involve the largest number of collisions.

Figure 5, shows information on collisions as a function of vessel classification. No major changes were noted between the two periods. As with the preceding figure, here it appears that dissimiliar vessels are more likely to collide than are vessels with the same classification.

COLLISIONS AS A FUNCTION OF VESSEL CLASSIFICATION

Combined Fiscal Years 1957, 1958, and 1959

	Other	Tug and Tow	Tanker	Freighter	Passenger
Passenger	1	0	3	2	0
Freighter	26	40	21	33	....
Tanker	11	20	8	....	....
Tug and Tow	9	19	....	....	....
Other	6	....	....	....	....

Combined Fiscal Years 1967, 1968, and 1969

	Other	Tug and Tow	Tanker	Freighter	Passenger
Passenger	3	1	0	3	1
Freighter	36	46	24	50	....
Tanker	10	28	5	....	....
Tug and Tow	5	4	....	....	....
Other	2	....	....	....	....

Figure 5

RULES OF THE ROAD/VESSEL LOCATION/SITUATION

	Applicable Rules of the Road				Location				Situation				
	Inland	International	Great Lakes	Western Rivers	Open Seas	Congested Waters	Narrow Channels	Sealanes	Meeting	Crossing	Overtaking	Fog	Other
Fiscal years:													
57, 58, and 59	153	20	26	.....	26	56	117	.....	104	40	38	.....	17
67, 68, and 69	118	72	18	10	35	60	121	.....	81	42	33	62	.....
Percent change	−22.9	+360.0	−30.8	.....	34.6	7.1	3.4	.....	−22.1	5.0	−13.2	.....	.....

Figure 6

Figure 6, sets up comparisons between applicable rules of the road, location of the collision, and the type of situation. A decrease of almost 25 percent was noted between the two decades in the number of collisions occurring in areas governed by the Inland Rules of the Road and a decrease of 30 percent was noted in Great Lakes collisions. Collisions under International Rules of the Road more than made up the difference with an increase of 360 percent over the two decades. An increase of just under 35 percent was noted in the number of collisions occurring in open seas whereas only small increases occurred in congested waters and narrow channels. The number of collisions in meeting and overtaking situations decreased by approximately 20 and 15 percent, respectively, while crossing situations increased 5 percent.

PASSING SIGNALS

Combined Fiscal Years 1957, 1958, and 1959	
Agreement Reached	33
Agreement Not Reached	152
Unknown	14

	Unknown	Signals Not Sounded	Signals Sounded
Signals Sounded	3	41	67
Signals Not Sounded	1	72	....
Unknown	15	....	....

Combined Fiscal Years 1967, 1968, and 1969	
Agreement Reached	35
Agreement Not Reached	164
Unknown	19

	Unknown	Fog Signals Sounded	Signals Not Sounded	Signals Sounded
Signals Sounded	4	0	34	72
Signals Not Sounded	6	16	39	....
Fog Signals Sounded	4	34	....	....
Unknown	9	....	....	....

Figure 7

Figure 7, provides strong support for the need to use whistle signals. In both time periods, over 30 collisions occurred despite the fact that a passing agreement had been reached. There was nearly a 50-percent decrease in the number of collisions occurring in cases when signals had not been sounded by either vessel from the fifties to the sixties.

VISIBILITY

Combined Fiscal Years 1957, 1958, and 1959	Daylight	Darkness	Twilight
Under 2 Miles	31	19	3
2 to 5 Miles	7	12	0
Over 5 Miles	41	80	6

Combined Fiscal Years 1967, 1968, and 1969	Daylight	Darkness	Twilight
Under 2 Miles	45	35	2
2 to 5 Miles	6	12	1
Over 5 Miles	35	79	3

Figure 8

Figure 8 provides information on the conditions of visibility at the time of collision. The greatest number of collisions occurred during darkness and when the visibility was over 5 miles.

INITIAL CONTACT

Combined Fiscal Years 1957, 1958, and 1959					Combined Fiscal Years 1967, 1968, and 1969						
	Undetermined	Sound	Visual	Radar		Undetermined	Collision	Radiotelephone	Sound	Visual	Radar
Radar	2	3	13	11	Radar	13	1	....	3	4	19
Visual	11	1	138	....	Visual	27	5	1	5	121	...
Sound	2	3	.....	....	Sound	1	....	....	....	.....	...
Undetermined	15	...	.....	....	Radiotelephone	....	....	10	....	.....	...
					Collision	1	....	....	....	.....	...
					Undetermined	7	....	....	....	.....	...

Figure 9

Figure 9 indicates the means by which initial contact was made between the vessels involved in the collision. In the largest number of cases, contact was made by visual observation.

RULES OF THE ROAD VIOLATIONS

Article/Rule	Total Fiscal Years 1957, 1958, and 1959		Total Fiscal Years 1967, 1968, and 1969		Percent Change
2	1		0		−100
3	1		3		+200
4–10	NA		5		.....
11	NA		1		.....
15	8		27		+200
16	64		68		+6
17	6		0		−100
18 Rule I	55		83		+5
18 Rule III	30	105	75	183	+150
18 Rule V	3		6		+100
18 Rule VIII	17		19		+12
19	13		38		+192
20	NA		0		.....
21	1		10		+900
22	10		31		+210
23	2		40		+1,900
24	15		15		0
25	27		76		+182
26	3		3		0
27	3		58		+1,833
28	4		23		+475
29	44		35		−21

Figure 10

Figure 10 lists the Rules of the Road by Article/Rule and provides information on the number of violations of each involving collisions during the two time periods. Some increases ranged as high as 1,900 percent with some minor decreases. Overall, there were 688 violations in the sixties as opposed to 307 for the fifties, an increase of 124 percent. The violations listed are those which, in the opinion of the reviewer, occurred even though the evidence may have been insufficient to initiate appropriate remedial action against the personnel or vessels involved.

CAUSES

Description	Total Fiscal Years 1957, 1958, and 1959	Total Fiscal Years 1967, 1968, and 1969	Percent change
Excessive Speed	77	81	+5
Insufficient Power	9	12	+33
Wrong Side of Channel	58	74	+8
Failure To Sound Signals	45	96	+113
Meeting Situation, Turned Left	27	29	+7
Crossing Situation Burdened, Failed To Give Way	24	32	+33
Failed To Stop or Back	15	53	+253
Evasive Maneuvering Too Little or Too Late	21	69	+229
Overtaking Vessel Failed To Keep Clear	29	24	−17
Overtaken Vessel Failed To Maintain Course	6	9	+50
Wind, Sea, or Current Were Factors	12	32	+167
Agreement Reached, Vessel Sheered	NA	11	.....
Agreement Reached, Other	NA	27	.....
Cross Signals	NA	12	.....
Evasive Action Not Prudent	NA	27	.....

Figure 11

Figure 11 attempts to provide statistics on the causes of the collisions during the two time periods. For both periods, excessive speed, being on the wrong side of the channel, and failure to sound signals predominated. Although information on some causes was not available in the fifties, all that were listed then, with the exception of one cause, increased from 7 to 250 percent in the 10-year interim, Specific increases were largest for these causes, "failed to stop or back," "evasive maneuver, too little or too late," "wind, sea, or currrent were factors," and "failure to sound signals."

Figure 12 attempts to attribute the collisions to material or personnel failures. As could be expected, personnel failures account for the largest share of the collisions with mechanical breakdowns accounting for only a small number. No substantial increase in the number or percentage of personnel failures was noted for the sixties.

MATERIAL/PERSONNEL FAILURES

Fiscal Years 1957, 1958, and 1959		Fiscal Years 1967, 1968, and 1969	
Description	Total	Description	Total
Material Failure	6	Material Failure	12
Personnel Failure	289	Personnel Failure	306
No Material Failure	390	No Failure	115
No Personnel Failure	107	Combination Material/Personnel	3
Material Failure Not Determined	2		
Personnel Failure Not Determined	2		

Figure 12

DEATHS/INJURIES

Description	Total Fiscal Years 1957, 1958, and 1959	Total Fiscal Years 1967, 1968, and 1969	Percent Change
Deaths	55	111	+101.8
Injuries	137	72	−47.4

Figure 13

Figure 13 contains surprising information on figures for deaths and injuries. From the fifties to the sixties there was a marked upsurge in the number of deaths from 55 to 111 or an increase of 102 percent. This may reflect such factors as the volatile nature of products shipped and increased traffic density in more recent years. The fatality statistics contrast sharply with those for injuries; which showed a marked decrease in the sixties. ⚓

Two Merchant Ships Receive Top Awards

The SS *President Jackson* and the SS *Export Ambassador* are sailing proudly as the recipients of two major merchant ship awards in recent months.

The *President Jackson* received the "Gallant Ship" award recently in San Francisco for the rescue of seven men from a sinking schooner in January 1970, while en route to New York in heavy seas. The *President Jackson* was notified through the Coast Guard's AMVER system that the schooner was sinking approximately 120 miles north of Bermuda. Capt. E. A. Olsen, master of the freighter, maneuvered his vessel alongside the schooner in 60-knot winds, managing to safely rescue all seven crewmen from the schooner with no injuries to either crew.

Accompanying the "Gallant Ship" award was a citation praising "the courage, resourcefulness, expert seamanship, and teamwork of her master, officers, and crew." The award, authorized by Congress, has been presented to 24 other United States and foreign merchant ships which have participated in "outstanding or gallant actions aimed as saving lives or property imperiled in marine disasters or other emergencies."

Editor's Note:

The *Proceedings* was on its way to the printer when we learned that Captain Olsen had received the maritime industry's highest award for distinguished seamanship, the American Merchant Marine Seamanship Trophy. The presentation was made by Assistant Secretary of Commerce for Maritime Affairs A. E. Gibson at a Maritime Day luncheon in San Francisco.

The SS *Export Ambassador* won first place in the 1970 Annual Ship Safety Achievement Awards dry cargo ship competition, cosponsored by the American Institute of Merchant Shipping (AIMS) and the National Safety Council's Marine Section. Under the command of Capt. E. Shellenbarger, the ship was able to rescue seven South Korean fishermen from their sinking vessel in April 1970. The master was forced to use a "backing down" maneuver twice in order to approach the sinking vessel and take all its crew aboard the *Export Ambassador*.

The award, presented in November 1970, was accompanied by a letter citing the rescue by the *Export Ambassador* as "in the highest tradition of the sea and of tremendous credit to the entire American Merchant Marine." This award is presented annually to American-flag ships which have performed outstanding feats of safety during the year. ⚓

Innovation in Rubber Fendering Appears on The Gulf Coast

A novel idea in rubber fendering has appeared on the Tampa (Fla.) Electric Co.'s new concrete pier.

By fastening two hollow rubber fenders to the dock behind the concrete dolphins (just below the man's feet in the above photograph), chipping of the two structures during docking operations has been effectively reduced. ⚓

The Goodyear Tire & Rubber Co.

NAVIGATION AND VESSEL INSPECTION CIRCULAR NO. 2–71

February 5, 1971

Subj: Pipe Stress Analysis Calculations; Procedure for Submission of

Ref: (a) 46 CFR 56.35–1(a)
(b) 46 CFR 56.07–10(c)
(c) 46 CFR 56.01–10

PURPOSE

To outline the material required to be included with the pipe stress analysis calculations which are submitted to the Commandant, United States Coast Guard, for review usiog digital computer facilities.

CANCELLATION

Navigation and Vessel Inspection Circular No. 3–65, dated 29 April 1965, is hereby canceled.

BACKGROUND

a. The majority of the pipe systems reviewed by the Coast Guard are reviewed solely for material and internal pressure. These systems do not require review by the Commandant and are normally reviewed by the nearest Marine Inspection Office or a field technical office as described in 46 CFR 50.20–5 (b) and (d).

b. However, the thermal stress analysis required by reference (a) and the dynamic analysis mentioned in reference (b) require the use of computer facilities. At the present time these facilities are not available to the local Marine Inspection Offices and the field technical offices. Therefore, this review is performed by the Commandant.

c. Pipe stress calculations submitted to the Commandant often do not contain sufficient information for proper evaluation and approval. The information required for the evaluation is also required for the design of a piping system and does not depend upon the method of analysis used. It is, therefore, readily available, and a complete initial submission will greatly reduce the time required for Coast Guard approval.

ACTION

Submissions of stress calculations for piping systems requiring review by the Commandant (MMT) should contain the following in triplicate:

a. A dimensioned isometric schematic drawing of the complete piping system. The points for which the stresses are calculated should be numbered in sequence.

b. A description of the method of analysis used.

(1) If hand calculations are used, representative calculations should be submitted along with a tabular listing of the data described below.

(2) If a digital computer is used, a copy of the input data and the complete output should be submitted along with a brief description of the program being used. A description of the input and output formats and any special codings used in the program should also be submitted for proper interpretation of the data. If the input data does not contain all of the data listed below, a supplemental list of the missing data should be included.

c. For thermal stress analysis calculations required by reference (a), the following data is required:

(1) For each type and size of pipe used in the system:

(i) Pipe outside diameter in inches.

(ii) Pipe wall thickness in inches.

(iii) Expansion coefficient or thermal strain in mils (0.001 inch) of expansion per inch of pipe length. This is the total thermal strain from datum (70° F.) to the design temperature.

(iv) Modulus of elasticity in tension at datum (70° F.) in pounds per square inch.

(v) Poisson's ratio.

(2) For each anchor:

(i) Coordinates of the anchor point.

(ii) Extraneous anchor movements in inches.

(3) For each bend:

(i) Coordinates of the intersection point of the incoming and outgoing tangents.

(ii) Bend radius.

(4) For each branch intersection point:

(i) Coordinates of the intersection point.

(5) For each valve, flange, or reducer:

(i) Coordinates of each end of the component.

(ii) Length of the component.

(iii) Expansion coefficient or thermal strain in mils (0.001 inch) of expansion per inch of component length. This is the total thermal strain from datum (70° F.) to the design temperature.

(iv) Modulus of elasticity in tension at datum (70° F.) in pounds per square inch.

(v) Poisson's ratio.

(6) Coordinates of any additional points for which the stresses are calculated.

d. For thermal stress analysis calculations seeking the increase in the allowable stress range permitted by section 102.3.2(d) of the American National Standards Institute (ANSI) Code B–31.1 (Power Piping), the following data is required:

(1) The data required in 4.c. above.

(2) For each type and size of pipe used in the system:

(i) Internal pressure in pounds per square inch.

(ii) Weight of the pipe and insulation in pounds per inch of pipe length.

(3) For each hanger or restraint:

(i) Coordinates of the point of attachment to the pipe or component.

(ii) Translational or rotational flexibility in inches per pound or radians per inch-pound as appropriate for the type of hanger or restraint.

(iii) Coordinates of the point of attachment to the ship.

(iv) Initial or dead weight load in pounds or inch-pounds as appropriate for the type of hanger or restraint.

(v) Extraneous hanger or restraint movements in inches or radians as appropriate for the type of hanger or restraint.

(4) For each valve, flange or reducer:

(i) Coordinates of the centroid of the component.

(ii) Weight of the component and insulation in pounds.

e. For dynamic stress analysis calculations mentioned in reference (b), the following data is required:

(1) The data required in 4.c. and 4.d. above.

(2) A description of the method of determining the accelerations on the system including all assumptions made in the analysis.

(i) If hand calculations are used, representative calculations should be submitted.

(ii) If a digital computer is used, a copy of the input data and the complete output should be submitted along with a brief description of the program being used. A description of the input and output formats and any special codings used in the program should also be submitted for interpretation of the data.

(3) The resultant accelerations and their direction cosines.

f. If review of the materials and internal pressure is requested to be performed by the Commandant (MMT), it will require submission of all of the data listed in reference (c) in addition to the above listed data. ⚓

NAVIGATION AND VESSEL INSPECTION CIRCULAR NO. 3–71

March 15, 1971

Subject: Load Line—Bulk Liquid Carriers—Subdivision

PURPOSE

This circular is intended to clarify the requirements of 46 CFR 42.20–5(a) with regard to the subdivision requirements for a bulk liquid carrier anticipating a TYPE A (tanker) minimum freeboard assignment.

BACKGROUND

The International Load Line Convention 1966 (ILLC 1966) in effect since 21 July 1968 requires specific interpretation with regard to several of its provisions. Some special interpretive regulations passed by the Intergovernmental Maritime Consultative Organization (IMCO) were added in June 1969, (46 CFR 42.20–3). However, questions have arisen concerning the interpretation of 46 CFR 42.20–5(a) and its relation to paragraph 42.20–5(b).

DISCUSSION

The description of a TYPE A vessel given in paragraph 42.20–5(a) sets forth several equally weighted qualifications for vessels carrying bulk liquids, most significant of which involves the phrase "high degree of safety against flooding, resulting from the low permeability of loaded cargo spaces and the degree of subdivision usually provided." It is this phrase which requires interpretation.

Subdivision of tank vessels during most of the period under the 1930 Load Line Convention was provided by two longitudinal bulkheads inboard of one-fifth the beam with transverse bulkheads dividing the cargo spaces into a number of sets of triplet tanks. This was the experience on which the 1966 Conference drew. This degree of subdivision, together with the fact that the vessel was essentially *already* flooded with the cargo, lent the ability to withstand flooding of two adjacent compartments *within the cargo length.*

This appears to be contradictory to the wording in 46 CFR 42.20–5(b). However, it is emphasized that paragraph 5(b) concerns empty compartments only. It was to insure consideration of the susceptibility of damage to an empty compartment that the convention delegates created the discussion in paragraph 42.20–5(b).

INTERPRETATION

Interpretation of 46 CFR 42.20 with regard to the definition of TYPE A vessels and subdivision must place primary emphasis on 46 CFR 42.20–5(a) rather than allowing any expansion of the "empty compartment" section. To do so would downgrade the normal level of safety in tanker subdivision.

Accordingly, the meaning of the phrase discussed above "high degree of safety . . ." means that a TYPE A vessel must safely withstand damage penetrating to within one-fifth the beam from the shell anywhere in the *cargo length* of the vessel.

This interpretation has already been applied to several vessels whose particular design or density of cargo required an exact instruction as to the meaning of Section 46 CFR 42.20–5. ⚓

AMENDMENTS TO REGULATIONS

Title 33 Changes

Chapter I—Coast Guard, Department of Transportation

SUBCHAPTER A—GENERAL

PART 3—COAST GUARD AREAS, DISTRICTS, MARINE INSPECTION ZONES, AND CAPTAIN OF THE PORT AREAS

Subpart 3.65—Thirteenth Coast Guard District

SEATTLE AND PORTLAND CAPTAIN OF THE PORT AREAS

The purpose of this amendment to Part 3 is to change the Seattle and Portland Captain of the Port areas.

Part 3 of Title 33, Code of Federal Regulations, describes the districts, zones, and areas into which the Coast Guard is divided for the performance of its assigned functions and duties. This amendment changes the area of responsibility of the Seattle Captain of the Port to reflect his assigned duty as On Scene Commander in accordance with the Seattle Coastal Region Pollution Contingency Plan. The changes in the description of the Seattle Captain of the Port zone requires changes in the description of the Portland Captain of the Port zone.

Since this amendment concerns a matter relating to agency management, the notice of proposed rule making and public procedure requirements in 5 U.S.C. 553 do not apply and it may be made effective in less than 30 days after publication in the Federal Register.

The complete text of these changes was published in the "Federal Register" of April 1, 1971.

Chapter I—Coast Guard, Department of Transportation

PART 82—BOUNDARY LINES OF INLAND WATERS

Grays Harbor, Wash.

The purpose of this amendment is to change the location of the line of demarcation that separates the high seas from rivers, harbors, and inland waters at Grays Harbor, State of Washington. This line indicates to mariners the point at which either the inland or international nautical rules of the road become applicable. The amendment was proposed in a notice of proposed rule making (CG FR 70–83) issued on July 1, 1970 (35 F.R. 10696).

That notice fully described the present requirements and the reasons for the amendment. Interested persons were given an opportunity to participate in the rule making procedure. No comments were received on the proposal. The amendment is adopted as proposed.

In consideration of the foregoing, Part 82 is amended by revising § 82.122 to read as follows:

§ 82.122 Grays Harbor, Wash.

A line drawn from Grays Harbor Bar Range Rear Light to Grays Harbor Entrance Lighted Whistle Buoy 3; thence to Grays Harbor Entrance Lighted Whistle Buoy 2; thence to Grays Harbor Light.

(Sec. 2, 28 Stat. 672; sec. 6(b)(1), 80 Stat. 937; 33 U.S.C. 151, 49 U.S.C. 1655 (b)(1); 49 CFR 1.46(b))

Effective date. This amendment shall become effective on April 2, 1971.

Dated: March 31, 1971.

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

[FR Doc. 71–4630 Filed 4–2–71; 8:49 am]
(Federal Register of April 3, 1971.)

Chapter I—Coast Guard, Department of Transportation

SUBCHAPTER O—POLLUTION

PART 153—CONTROL OF POLLUTION BY OIL AND HAZARDOUS SUBSTANCES, DISCHARGE REMOVAL

Pollution Fund

1. The purpose of this amendment to Title 33, Code of Federal Regulations, Part 153, is to set forth policies and procedures and prescribe reporting requirements applicable to the special fund established by the Federal Water Pollution Control Act, as amended by the Water Quality Improvement Act of 1970.

2. Subsection 11(c) of the Act

ACCEPTABLE HYDRAULIC COMPONENTS

Nonductile hydraulic components which have passed high impact shock tests. Unless otherwise noted, the material is cast iron.

Manufacturer	Valve type	Identity	Maximum allowable pressure (p.s.i.)
Parker Hannifin, Industrial Hydraulics Division, 100 Parker Dr., Otsego, Mich. 49078.	Directional control valve	111******C	3000
	do	114******C	3000
	Pressure control valve	MPR*16M**A	2550
Do	do	MSD*16M**A	2550
Do	do	MSR*16M**A	2550
Do	do	MUL*16M**A	2550
Do	do	MBD*16**A	2550
Vickers Marine & Ordnance Division, Troy, Mich., 48084.	do	R*T-10-***-2*	2500
	Directional valve, 2-spool or, by extension, 3-spool.	CM2N02	2500

provides that whenever any oil is discharged into or upon the navigable waters of the United States, or adjoining shorelines, or waters of the contiguous zone, the President is authorized to act to remove such oil at any time. Subsection 11(i) provides for the recovery of reasonable costs incurred by the owner or operator of a vessel, onshore facility, or offshore facility in removing an oil discharge in certain cases. Section 12 of the Act pertains to control of hazardous polluting substances other than oil and requires that the President, if appropriate, shall remove any substance designated a hazardous polluting substance that is discharged into or upon the navigable waters of the United States or adjoining shorelines or the waters of the continguous zone, unless removal is immediately undertaken by the owner or operator of the vessel or onshore or offshore facility from which the discharge occurs.

3. Section 11(k) of the Act authorizes an appropriation to a special fund of not to exceed $35 million to be established in the Treasury to carry out the provisions in subsection 11(c), (i) and (l) and sections 12 of the Act. Section 11(l) of the Act, provides that the President may delegate the administration of section 11 to appropriate Federal departments, agencies, and instrumentalities. Executive Order No. 11548 (35 F.R. 11677) delegates to the Secretary of Transportation, among other things, the responsibility and authority to administer the fund established pursuant to subsection 11(k) of the Act. The Secretary has redelegated the responsibility and authority for the fund to the Commandant in 49 CFR 1.46 (35 F.R. 14509).

4. These amendments add a new Subpart D to Part 153. Subpart C is reserved for rules for removing oil or hazardous substances. New § 153.303 indicates the kinds of costs that may be paid or reimhursed from the fund under the Act. The National Contingency Plan separates the actions taken to respond to a spill or pollution incident into five phases: Phase I, Discovery and Notification; Phase II, Containment and Countermeasures; Phase III, Cleanup and Disposal; Phase IV, Restoration; and Phase V, Recovery of Damages and Enforcement. Only Phase II and III actions taken in response to a spill or pollution incident are considered to be eligible costs to be charged to the fund.

5. Phase II actions are defensive actions and may include source control procedures, public health protection activities, salvage operations, placement of physical barriers to halt or slow the spread of a pollutant, emplacement or activation of booms or barriers to protect specific installations or areas, control of the water discharge from upstream impoundments and the employment of chemicals and other materials to restrain the pollutant and its effect on water related resources. Phase III includes actions taken to remove the pollutant from the water and related onshore areas such as the collection of oil through the use of sorbers, skimmers, or other collection devices, the removal of beach sand, and safe, nonpolluting disposal of the pollutants that are recovered in the cleanup process.

6. Actions described in the other phases of the plan, that is, notification, restoration and enforcement, are not chargeahle against the fund because the fund is considered to be available only for the cost of those actions taken under the plan to minimize damage from oil and hazardous polluting substance discharges, including containment, disposal, and removal.

7. Although Phase II includes defensive actions to be initiated as soon as possible after discovery of a "pollution incident", which includes an imminent threat of a spill as well as an actual spill of oil or other hazardous substance, such defensive actions in response to the imminent threat of a spill are not chargeable to the fund.

8. Although the fund is not intended to pay for removal of oil spilled by offshore facilities that are regulated under the Outer Continental Shelf Lands Act, it would be available for removal of oil discharged into the contiguous zone. To this extent, the costs of a response to a spill from a facility covered by the Outer Continental Shelf Lands Act could be charged to the fund.

9. This amendment does not specify in detail the kinds of costs that may be charged to the fund. The Coast Guard will prepare instructions to assist in the determination of appropriate costs by District Commanders and On-Scene Commanders. Until such instructions are included in the National Contingency Plan, the Coast Guard will have appropriate instructions and distribute them to individuals and agencies concerned.

10. Sections 153.305 through 153.319 contain delegations procedural requirements and information concerning administration of the fund.

11. Since the addition of this Subpart D to Part 153 involves delegations of authority and statements of policy and procedures, I find that public notice and procedure thereon are not necessary, and that this amendment may become effective in less than 30 days. In consideration of the foregoing, Part 153 is amended effective May 13, 1971.

The complete text of these changes was published in the "Federal Register" of April 13, 1971.

AFFIDAVITS

The following affidavits were accepted during the period from May 15 to June 15, 1971:

Service Bronze and Brass Works, Inc., 5032 SE. 26th Ave., Portland, Oreg. 97202. FITTINGS AND FLANGES.

Imperial Eastman Corp., 6300 West Howard St., Chicago, Ill. 60648. VALVES AND FITTINGS.

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 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 January 1, 1971 are now available from the Superintendent of Documents price: $3.75.

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 (5–1–68). F.R. 6–7–68, 2–12–69, 10–29–69.
115	Marine Engineering Regulations and Material Specifications (7–1–70). F.R. 12–30–70.
123	Rules and Regulations for Tank Vessels (5–1–69). F.R. 10–29–69, 2–25–70, 6–17–70, 10–31–70, 12–30–70.
129	Proceedings of the Marine Safety 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, 5–11–67, 12–23–67, 6–4–68, 10–29–69, 11–29–69, 4–3–71.
172	Rules of the Road—Great Lakes (9–1–66). F.R. 7–4–69, 8–4–70.
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 (2–1–71).
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, 5–11–67, 12–23–67, 6–4–68, 11–29–69, 4–3–71.
190	Equipment Lists (8–1–70). F.R. 8–15–70, 9–29–70.
191	Rules and Regulations for Licensing and Certificating of Merchant Marine Personnel (5–1–68). F.R. 11–28–68, 4–30–70, 6–17–70, 12–30–70.
200	Marine Investigation Regulations and Suspension and Revocation Proceedings (5–1–67). F.R. 3–30–68, 4–30–70, 10–20–70.
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 (5–1–68). F.R. 10–29–69, 5–15–70, 9–11–70, 1–20–71, 4–1–71.
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.
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.
258	Rules and Regulations for Uninspected Vessels (5–1–70).
259	Electrical Engineering Regulations (3–1–67). F.R. 12–20–67, 12–27–67, 1–27–68, 4–12–68, 12–18–68, 12–28–68, 10–29–69, 2–25–70, 4–30–70, 12–30–70.
266	Rules and Regulations for Bulk Grain Cargoes (5–1–68). F.R. 12–4–69.
268	Rules and Regulations for Manning of Vessels (5–1–67). F.R. 4–12–68, 4–30–70, 12–30–70.
293	Miscellaneous Electrical Equipment List (9–3–68).
320	Rules and Regulations for Artificial Islands and Fixed Structures on the Outer Continental Shelf (11–1–68). F.R. 12–17–68, 10–29–69.
323	Rules and Regulations for Small Passenger Vessels (Under 100 Gross Tons) (7–1–69). F.R. 10–29–69, 2–25–70, 4–30–70, 10–31–70, 12–30–70.
329	Fire Fighting Manual for Tank Vessels (7–1–68).

CHANGES PUBLISHED DURING APRIL 1971

The following have been modified by Federal Registers:

CG–239, Federal Register, April 1, 1971 and CG–169 and CG–184, Federal Register, April 3, 1971.

CHANGES PUBLISHED DURING MAY 1971

(NO CHANGE)