PROCEEDINGS OF THE
MERCHANT MARINE COUNCIL
UNITED STATES COAST GUARD

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CG 129

Vol. 9 October 1952 No. 10

BE FIRE SAFE

HELP PREVENT NEEDLESS WASTE

Proceedings of the

MERCHANT MARINE COUNCIL

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HELP PREVENT NEEDLESS WASTE

Due to the fact preventable fires destroy millions of dollars of American property and bring death or permanent disability to scores of thousands each year, it is customary for the President of the United States to set aside a week in October as Fire Prevention Week. By this means every man, woman, and child is urged to take part in a year-round campaign against the needless waste of life and the destruction of property by preventable fires. We hope our readers will join this crusade. We hope they will refresh their memories as to which types of fires they may encounter, remember how to combat them, and take steps to prevent them.

The following questions raise basic points in fire prevention and they will undoubtedly bring more to mind. Each should be answered with a resounding YES! See if you, your ship, and shipmates are fire conscious.

Is there a complete, up-to-date, fire bill on board? Is it posted in a prominent place? Does it delegate specific duties to the ship's personnel? Does it list the amount and kind of equipment which should respond to a fire call? Are crew members and officers familiar with its contents?

Are you familiar with the location, amount, and size of fire hose?

Are nonconducting types of fire extinguishers located near electrical hazards? Are fire extinguishers placed where they will not be knocked over, but yet are still easily accessible? Are fire extinguishers checked frequently for: being in proper locations; being unobstructed; for proper weight and tags?

Do you know where the breathing devices are located aboard ship? Are life lines provided with breathing devices?

Is fire-fighting equipment checked frequently?

Are no smoking areas prescribed and marked?

Does good housekeeping prevent the accumulation of refuse and combustibles in unsafe locations and prevent disorderly arrangements, the cluttering of fire aisles, the blocking of exits, extinguishers, and hydrants, and other practices which would render it difficult to attack a fire?

Does maintenance and inspection of electrical wiring and electrical systems remove danger of fire from this cause?

Are sources of spontaneous combustion eliminated?

Are inflammable liquids stored, transferred, and handled in a safe manner? Are containers and areas designated for their use properly marked?

Is the ventilation sufficient to prevent the accumulation of combustible dusts and explosive vapors?

Are sparks from welding, grinding, etc., guarded against?

Are hazardous materials and chemicals handled and stored so they do not create fire hazards?

Is GOOD HOUSEKEEPING practiced DAILY?

COUNCIL ACTIVITIES

A portion of the revised Marine Engineering Regulations were published in the Federal Register No. 164, dated August 21, 1952, 17 F. R. 7626–7685. Due to space limitations, it is not possible to reprint them herein. However, copies may be obtained from the Commandant (CMC), U. S. Coast Guard, Washington 25, D. C., upon request. The summary of the amendments, as published in the Federal Register, describes the changes made.

A notice regarding the proposed revision of the marine engineering regulations and material specifications, together with certain proposed changes and transfer of requirements relating to marine engineering presently published in the tank vessel regulations, load line regulations, and general rules and regulations for vessel inspection, was published in the Federal Register dated August 16, 1951, 16 F. R. 8136–8139, as Items I to IX, inclusive, on the agenda to be considered by the Merchant Marine Council, and a public hearing was held by the Merchant Marine Council on September 18, 1951, in Washington, D. C. Another notice regarding further proposed changes in the marine engineering regulations and material specifications was published in the Federal Register dated February 27, 1952, 17 F. R. 1727–1731, as Items VII, and XII to XVII, inclusive, on the agenda to be considered by the Merchant Marine Council, and a public hearing was held by the Merchant Marine Council on March 25, 1952, in Washington, D. C. Since the 1948 Convention for Safety of Life at Sea becomes effective on and after November 19, 1952, and it is necessary to change the regulations to complement and implement this Convention, a revision in the format of the regulations presently contained in Chapter I of Title 46 (Shipping), Code of Federal Regulations, is necessary in order that the regulations may be published in compliance with the Administrative Procedure Act. In order to have an orderly presentation of marine engineering regulations, only those changes in 46 CFR Parts 51 to 57, inclusive, which will not be affected by the general revision of regulations to be made to implement the 1948 Convention, are contained in this document. The proposed changes described in the notices published in the Federal Register dated August 16, 1951, and February 27, 1952, and considered by the Merchant Marine Council at public hearings held September 18, 1951, and March 25, 1952, which have not been included in this document, will be incorporated in the document containing the necessary revision of Chapter I (Shipping) expected to be published before the 1948 Convention becomes effective November 19, 1952.

All the comments, views, and data submitted either in writing or orally at the public hearings were considered and, where practicable, were incorporated into the regulations.

The purpose of the amendments to the regulations contained in this document is to revise and bring up to date the requirements for marine engineering and material specifications applicable to merchant vessels and to transfer to the marine engineering regulations certain revised engineering requirements from the tank vessel regulations, load line regulations, and general rules and regulations for vessel inspection, as well as to establish a new specification for automatically controlled, packaged auxiliary boilers.

The requirements for steering apparatus have been revised, consolidated and transferred to 46 CFR Subpart 57.25 in the marine engineering regulations. This was done to eliminate conflicting requirements, as well as to clarify Coast Guard regulations previously contained in over 14 different sections in 46 CFR Chapter I, which were also published in the Tank Vessel Regulations (CG–123), Load Line Regulations (CG–176) and the various General Rules and Regulations for Vessel Inspection (CG–170, 186, 189, and 185). Where necessary, appropriate cross references have been made. This was considered at Item IX on the agenda for the public hearing held September 18, 1951, and Item VII on the agenda for the public hearing held March 25, 1952. The revised regulations for steering apparatus are in substantial agreement with the American Bureau of Shipping Rules and the petitions from several manufacturers and others were considered and incorporated into the regulations.

This revision of the marine engineering regulations in 46 CFR Parts 51 to 57, inclusive, as well as the Marine Engineering Regulations and Material Specifications (CG–115), changes the requirements to permit the use of liberalized design stresses based upon a factor of safety of four under certain restricted requirements which must be met in order to use the higher stresses allowed; to utilize common practices and procedures employed in the industry insofar as possible; to clarify existing requirements; to effect necessary editorial changes; and to bring the requirements into closer agreements with the rules of the American Bureau of Shipping, standards for the American Society for Testing Materials, and various codes of the American Society of Mechanical Engineers. While relaxations have been made to permit the use of liberalized design stresses under certain conditions, the application of the revised regulations may in certain isolated cases be more stringent than before. This will be based on individual findings of each Officer in Charge, Marine Inspection. The petitions received from industry, as well as the many comments submitted, were considered and in most cases were accepted with minor modifications.

The revision of 46 CFR Part 51, regarding materials and material specifications used in marine engineering construction, has been made in order to utilize insofar as possible the practices and procedures used by industry. In this revision of material requirements, the Coast Guard has adopted by reference various material specifications of the American Society for Testing Materials and, where necessary, only those specific limitations applicable to certain materials are set forth in the regulations. Since the A. S. T. M. specifications have been widely accepted and are normally used in specifying requirements for materials purchased from steel manufacturers, the adoption of standard specifications with limitations applicable to certain materials when used in marine service, will be beneficial to both the steel manufacturer and the purchaser. A new regulation designated 51 CFR 51.01–95 permits the use of materials complying with the requirements set forth in applicable A. S. T. M. emergency alternate provisions for the period of the National Emergency proclaimed by the President on Dec. 16, 1950. The revision also relaxes material requirements for flange and firebox quality steel plate in order that the maximum temperature permitted may be increased from 500 degrees to 650 degrees F. to be consistent with the limitations imposed on this material when used as flange material in piping systems.

The revision of the construction regulations in 46 CFR Part 52, as well as in the Marine Engineering Regulations and Material Specifications (CG–115), brings these regulations up to date with modern usages and practices of industry; changes certain definitions and general requirements by incorporating the American Soci-

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ety of Mechanical Engineers stresses in the design formulas governing shells and heads of boilers and unfired pressure vessels; provides stress tables for ferrous materials; establishes definite limitations for the design of boilers and unfired pressure vessels employing stresses based upon a factor of safety of 4, such as corrosion allowance, removal of welding reinforcement, and consideration of additional stresses imposed by effects other than internal pressure; establishes new tables for allowable welded joint efficiencies, which permit increases in the basic welding efficiencies for Classes I, II, and III pressure vessels by the removal of weld reinforcement and by the use of spot radiography and stress relief; revises design formulas for cylindrical shells and dished heads of boilers and unfired pressure vessels, welding requirements covering furnaces, fireboxes, and waterlegs on fire tube boilers, and formulas for determining the allowable pressure and minimum thickness of boiler tubes so that these requirements will be in closer agreement with the American Society of Mechanical Engineers boiler code as petitioned by manufacturers; and provides a method for determining the ligament efficiency in tube sheets with unsymmetrically spaced holes.

The changes in 46 CFR Part 53, regarding low pressure heating boilers, (Marine Engineering Regulations and Material Specifications (CG-115)) make the Coast Guard requirements similar to the current heating boiler code of the American Society of Mechanical Engineers. The factor of safety of five has been retained for the design of heating boilers. However, the requirements regarding the capacity and testing of safety and relief valves on low pressure heating boilers have been revised in part and further changes will be considered by the Merchant Marine Council at its next public hearing. New requirements have been added covering automatically controlled packaged type heating boilers.

The revision of the unfired pressure vessel regulations in 46 CFR Part 54, as well as in the Marine Engineering Regulations and Material Specifications (CG-115), establishes a uniform set of requirements for the design and construction of unfired pressure vessels. The requirements covering stress relieving of unfired pressure vessels constructed of A. S. T. M. A204 and A212 steel plate have been revised to agree with the American Society of Mechanical Engineers unfired pressure vessel code. There have been added a table of stresses for nonferrous materials and cast iron; design formulas for tube sheets and tubes of heat exchangers, and cast iron heads; and requirements regarding access and inspection openings to provide for suitable inspection and cleaning of unfired pressure vessels. The requirements have been revised for nozzle openings and reinforcements and pressure relief devices on unfired pressure vessels.

The piping system regulations in 46 CFR Part 55, as well as in Marine Engineering Regulations and Material Specifications (CG-115), have been revised and new requirements have been added for new materials permitted. The piping material stress table has been revised by incorporating additional piping materials for use in high temperature service and a number of new non-ferrous grades have been added. The design pressures for piping have been clarified in order to establish minimum design requirements for saturated and superheated steam piping. The requirements covering the design of pipe pierced with tube holes have been revised to agree with the American Society of Mechanical Engineers code. The allowable variations in pressures and temperatures above the design limit for piping have been clarified. Certain requirements covering design of valves, plug cocks, and flange joints have been revised to clarify their intent. The design of boiler feed and blow-off piping has been revised to require a design pressure of not less than 125 percent of the maximum allowable pressure of the boiler. The number and location of independent bilge suctions required have been revised to agree with the 1948 Convention for Safety of Life at Sea. Changes have also been made to the fuel oil service requirements to permit a vessel having an auxiliary packaged boiler not exceeding 3,000 pounds per hour generating capacity to be equipped with a single fuel oil pump and heater. Vessels burning fuel oils of low viscosity will no longer be required to be equipped with fuel oil heaters. Certain requirements covering lubricating oil systems have been revised to agree with the American Bureau of Shipping Rules. The regulations for sounding pipes have been revised to clarify their intent.

The welding regulations in 46 CFR Part 56, as well as in the Marine Engineering Regulations and Material Specifications (CG-115), have been revised by clarifying the scope of the regulations; redefining welding terms employed in welding processes to agree with the American Welding Society standard, and changing certain requirements regarding acceptable types of welded joints to agree with the American Society of Mechanical Engineers' codes and American Bureau of Shipping rules. The revision of Subpart 56.01, regarding arc welding and gas welding, deals with the scope of the regulations; definition of welding terms used; approval of plans showing essential fabrication details; requirements for submerged arc welding electrodes; joint efficiency requirements for Classes II and III welded pressure vessels; revised figures illustrating joint details; requirements for various types of welded joints, seal welding and intermittent welding; stress relieving requirements for Class II welded pressure vessels; classes I and II welded piping connections; and slip-on flanges of Class I welded piping. The revision of Subpart 56.05, regarding tests and inspection, deals with new requirements for spot radiography of welded joints for Class II welded pressure vessels designed with a factor of safety of 4. The changes in Part 56 bring the regulations into closer agreement with American Welding Society standards, American Society of Mechanical Engineers' codes, Navy Department requirements, and American Bureau of Shipping rules.

The requirements regarding installations, tests, inspections, repairs, etc., in 46 CFR Part 57, and considered as Item VIII on the agenda of the Merchant Marine Council at the public hearing held September 18, 1951, were considered favorably but the publication of the revised regulations is being postponed in order that these regulations will not be further amended by changes in section numbers and cross references when it is necessary to revise the arrangement of regulations in 46 CFR Chapter I (Shipping). These regulations will be included in the document containing the necessary revision of Chapter I expected to be published before the 1948 Convention of Safety of Life at Sea becomes effective November 19, 1952.

The new specification regarding automatically controlled, packaged, auxiliary boilers has been added as a new Subpart 162.026 in Subchapter Q (Specifications) in 46 CFR Chapter I. This specification sets forth the requirements for the manufacturer to follow in manufacturing such equipment and covers design, construction, controls required, boiler alarms, tests and inspections required, and procedure for approval.

LIFE LINES ARE LIFE SAFERS

GOGGLES:

HELMETS:

SAFETY BELTS:

PRACTICAL FIRST AID

NAVIGATION WITHOUT MATHEMATICS?

A paper presented by Rear Admiral Alfred C. Richmond, Assistant Commandant, United States Coast Guard, before the Institute for Teachers of Mathematics, Duke University, Durham, N. C., on Friday, August 8, 1952. This paper briefly describes the history of Astronomical Navigation and quickly leads to the mathematics of the hyperbola which is the heart of the Loran System of Navigation. The basic Loran equation is derived and the inherent accuracies of the system are discussed. Finally the problem of reducing plane hyperbola to an oblate-spheroidal surface is outlined and one approximate method is explained.

The subject of my paper must have caused some of you to raise your eyebrows. I suspect that it must have appeared to you as extremely ridiculous that anyone should have the temerity to appear before a group attending a mathematics institute and undertake to talk about navigation without mathematics. This is particularly so when one reflects that any school boy knows that mathematics is the handmaiden of navigation.

Tonight, however, I intend to describe to you a wartime improvement in the art of navigation which I hope will prove to you that the subject of my remarks was well chosen, at least in a qualified sense. At the outset I concede that navigation and mathematics are inextricably allied. The earliest Phoenician navigator, when out of sight of land, undoubtedly kept some sort of dead reckoning which required, if nothing more, simple arithmetical rules of addition. Further, while coasting, he undoubtedly used the simple bow and beam bearing on known land points, thus presupposing some knowledge of the relation of the parts of a triangle. It may even be that early in the history of navigation the relation of the altitude of the pole star to what we now call latitude was recognized, and navigators in the northern hemisphere, by crude measurement of this altitude, arrived at a rough approximation of their position north or south of some known point.

As exploration spread, and the knowledge that the earth was a sphere became common, navigation improved, although slowly. Obviously, one big advance was the adoption of a system of coordinates for position reference, another device of mathematics. The actual art of navigation did not, however, change greatly from the early dead reckoning, with occasional latitude observations either of the sun on the meridian or of the pole star, until the invention of the marine chronometer during the middle of the eighteenth century. This, of course, opened the way to reasonably accurate longitude observations, and the science of navigation based essentially on the solution of the spherical triangle.

Curiously enough, the science of navigation made little progress after that until the speed of travel forced innovations to minimize the time required for the navigator to take an observation and reduce it to a position on the chart.

A little over 100 years ago Nathaniel Bowditch, impelled through the necessity of our fast clipper ships knowing at all times their position with reasonable accuracy, compiled the known methods of navigation in a book now known as the American Practical Navigator which, with its tables is still, in a modernized version, the fundamental textbook of navigation. The methods described in the original manuscript were not altered appreciably until about 25 years ago when the speed of surface vessels and aircraft demanded faster means. The development of the concept of the "Sumner Line of Position" permitted the derivation of the actual fix through the mathematical artifice of using the coordinates of an assumed position. This readily led to precomputed spherical trigonometric tables based on the concept that the assumed coordinates of latitude and longitude could be chosen to preselected degrees and minutes of arc.

Developments in Astronomical Navigation have continued until today we think in terms of Comptometers along with complicated optical and mechanical methods. However, electronics has provided the most radical developments through the transmission of positional data from fixed locations on the earth. Loran is one of the most successful methods that has been devised for long range navigation. In fact the word Loran is derived from the initial letters of the words "Long Range Navigation" and consequently implies that the distances involved in its use are greater than those encountered in the use of the familiar electronic methods. The Loran system is usable at ranges of up to 900 nautical miles by day and 1,500 nautical miles by night.

There are two basic characteristics of radio signals that may be used for deriving positional data. One is the direction of the arrival of the signal wave front; the other is the time of arrival of the signal, usually measured relative to that of another related signal. Loran utilizes the latter of

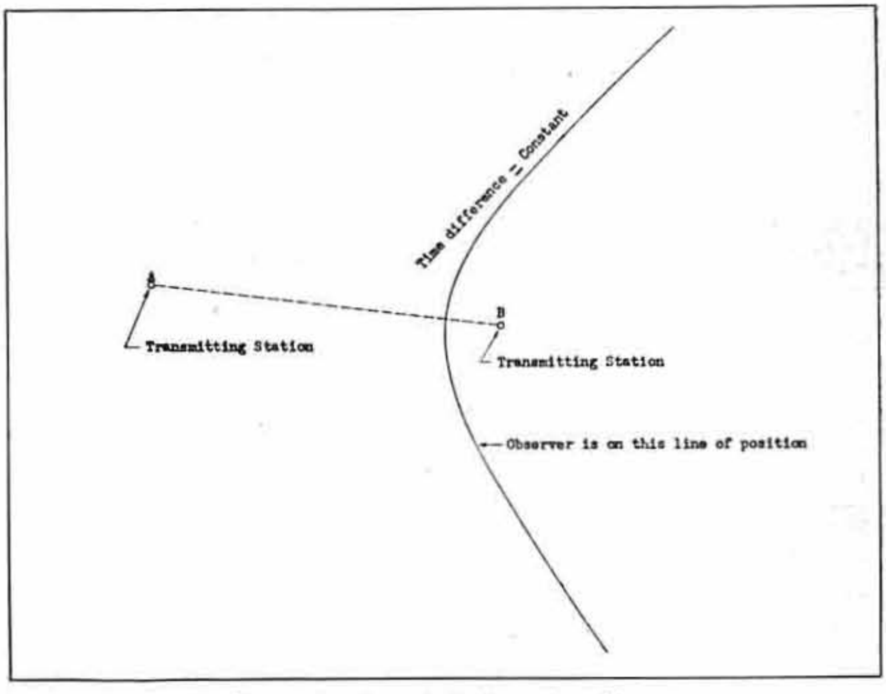


FIGURE 1. *Hyperbolic line of position.*

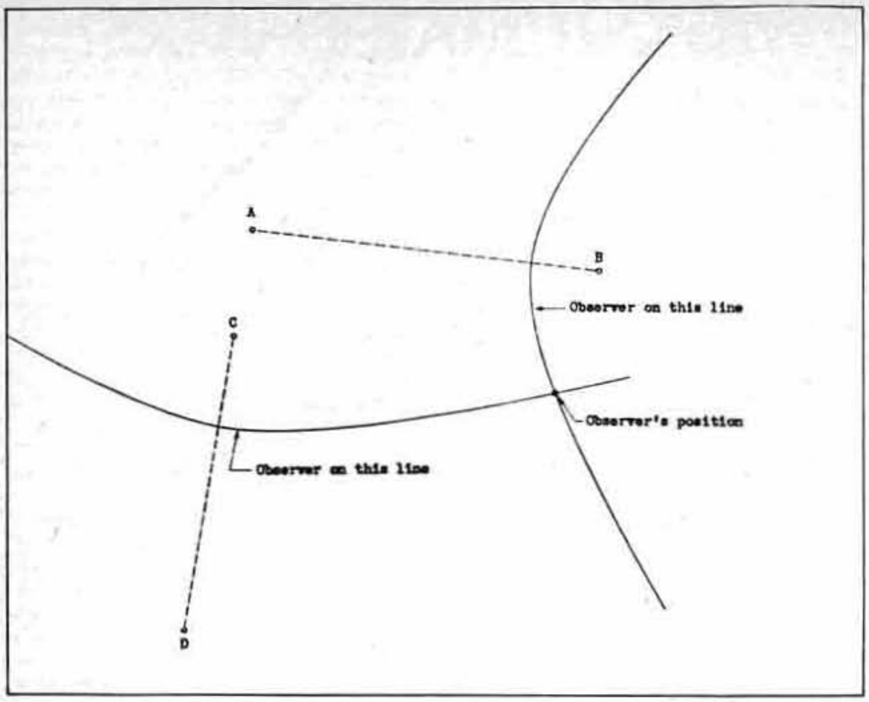


FIGURE 2. *Position fix from two hyperbolic lines of position.*

the two, more specifically the principle of measurement of the difference in times of arrival of two signals, initiated in precise synchronization at two widely spaced transmitting stations. This measured time difference is a direct indication of the difference in distances from the observer to each of the transmitting stations.

See Figure 1.

The locus of points, the difference of whose distances from two fixed points is a constant, is a hyperbola. Measurement of a given time difference, therefore, fixes the observer's position on a hyperbola for which the two transmitting stations are the foci. Such hyperbolas are presented for the navigator's use both graphically on Loran charts and in tabular form in Loran tables.

See Figure 2.

Obtaining a minimum of two of these hyperbolic lines of position by time difference measurements of a corresponding number of station pairs thus enables the navigator to determine a position fix.

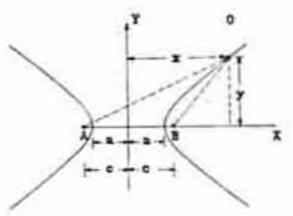
Inasmuch as the Loran system is essentially a hyperbolic system we will first review the general characteristics of the hyperbola before elaborating on its specific application to Loran.

See Figure 3.

Here points A and B are the foci and point O is chosen arbitrarily. To simplify the algebra A and B have been located on the x-axis, symmetrically placed with respect to the origin of the rectangular coordinate system. Then, from the definition of the hyperbola, we desire the analytic expression for the curve traced by the point O, while satisfying the relation OA minus OB is equal to some arbitrary constant, "$2a$." Using the Pythagorean theorem, expressions in terms of x and y are obtained for the lengths OA and OB, and these expressions are substituted in the defining relation to derive equation (3). Squaring both sides of the equation to eliminate radicals and simplifying as in steps (4) through (8), leads us to equation (9) which may be brought into the familiar standard equation for the hyperbola.

$$\frac{x^2}{a^2}-\frac{y^2}{b^2}=1,$$

with the substitution $b^2=c^2-a^2$. This equation may be solved for x or y as in equations (11) and (12). The significance of the constant "a" is immediately apparent upon inspection of these equations. When y is equal to zero, x is equal to plus or minus "a," determining the points where the hyperbolas intersect the x-axis for any arbitrary value of "a." Furthermore it is evident that x must be equal to or greater than "a" in order to obtain real values for y. For a given separation of the foci, A and B, then, there is a family of plane confocal hyperbolas, symmetrically placed with respect to the coordinate axes. For each particular value of "a" there are two hyperbolas, each the mirror image of the other relative to the y-axis. Therefore "a," or "$2a$," is the parameter which defines two particular hyperbolas among the family determined by a given separation of A



(1) $OA - OB = 2a$

(2) $OA = \sqrt{y^2 + (x+c)^2}\ ;\ OB = \sqrt{y^2 + (x-c)^2}$

(3) $\sqrt{y^2 + (x+c)^2} - \sqrt{y^2 + (x-c)^2} = 2a$

(4) $2a + \sqrt{y^2 + (x-c)^2} = \sqrt{y^2 + (x+c)^2}$

(5) $4a^2 + 4a\sqrt{y^2 + (x-c)^2} + y^2 + x^2 - 2cx + c^2 = y^2 + x^2 + 2cx + c^2$

(6) $\sqrt{y^2 + (x-c)^2} = \frac{cx}{a} - a$

(7) $y^2 + x^2 - 2cx + c^2 = \frac{c^2x^2}{a^2} - 2cx + a^2$

(8) $x^2\left(\frac{c^2 - a^2}{a^2}\right) - y^2 = c^2 - a^2$

(9) $\frac{x^2}{a^2} - \frac{y^2}{c^2 - a^2} = 1$

(10) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ where $b^2 = c^2 - a^2$

(11) $x = \pm \frac{a}{b}\sqrt{y^2 + b^2}$

(12) $y = \pm \frac{b}{a}\sqrt{x^2 - a^2}$

FIGURE 3. *Derivation of hyperbola equation.*

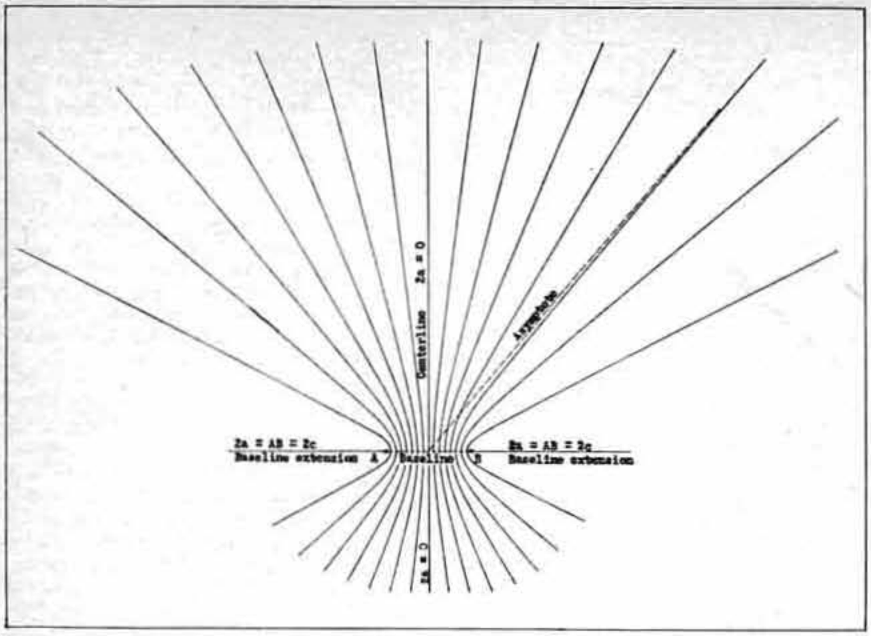


FIGURE 4. *Family of plane confocal hyperbolas.*

and *B*. It is the equivalent or counterpart of this quantity in time units which must be measured in the application of this hyperbolic system to Loran. A means of resolving the ambiguity of the two possible hyperbolic lines of position must also be provided.

See Figure 4.

The line of zero difference in distance, $a=O$, called the centerline, is the perpendicular bisector of the line joining the foci, and may be considered as a hyperbola of zero curvature. The line joining the foci, we shall call the baseline, and the segments of this line extended through the foci, we shall call the baseline extensions. The latter actually consist of hyperbolas folded together, with curvature degenerated into 180 degree angles at the respective foci. At distances from the baseline greater than about five times the length of the baseline, the hyperbolas are very nearly straight becoming asymptotic to radii extended from the origin, or intersection of baseline and centerline. The lines of maximum difference are the baseline extensions, and inspection shows that the maximum absolute value of this difference is equal to the length of the baseline or the distance between the foci.

Hyperbolas in the neighborhood of the centerline curve slightly away from it whereas hyperbolas in the neighborhood of a focus curve sharply around the focus. It is this diverging characteristic of adjacent hyperbolas which gives rise to a varying position error in a hyperbolic system. We shall temporarily neglect the ambiguity of two hyperbolas corresponding to a given value of the distance difference "2*a*," which in any event may be resolved by consideration of the algebraic sign of "*a*."

See Figure 5.

For a particular point in the system, there is, then, a particular value of distance difference corresponding to the hyperbola passing through this point. If an error is made in determination of this difference, an observer would thus obtain his position as lying on an adjacent hyperbola. The resultant error in position will therefore vary, depending upon the degree of divergence of adjacent hyperbolas in the region of his true position. A measure of this resultant position error is the factor of geometrical precision. It is defined as a ratio of the distance between a point *P1* on a hyperbola and the nearest point *P2* on an adjacent hyperbola of the same family, to the change in distance differences corresponding to the two hyperbolas, $2a_2 - 2a_1$. In Loran terminology this reduces to miles per microsecond.

See Figure 6.

It may be demonstrated geometrically that the factor of geometrical precision at a point is equal to one-half the cosecant of half the angle formed by the lines connecting the point to the foci. Therefore, the curve of constant factor of geometrical precision is a curve upon which this angle is a constant. From the elementary geometry of the circle it may be seen that this curve is the figure eight or lens formed by corresponding arcs of two circles, symmetrically placed with respect to the baseline and passing through the two foci. We may see, then, that poistional errors resulting from incorrect measurement of distance difference, increase with distance from the baseline, and with approach to the baseline extensions.

See Figure 7.

Now let us consider the utilization of this hyperbolic system as applied to Loran. The two transmitting

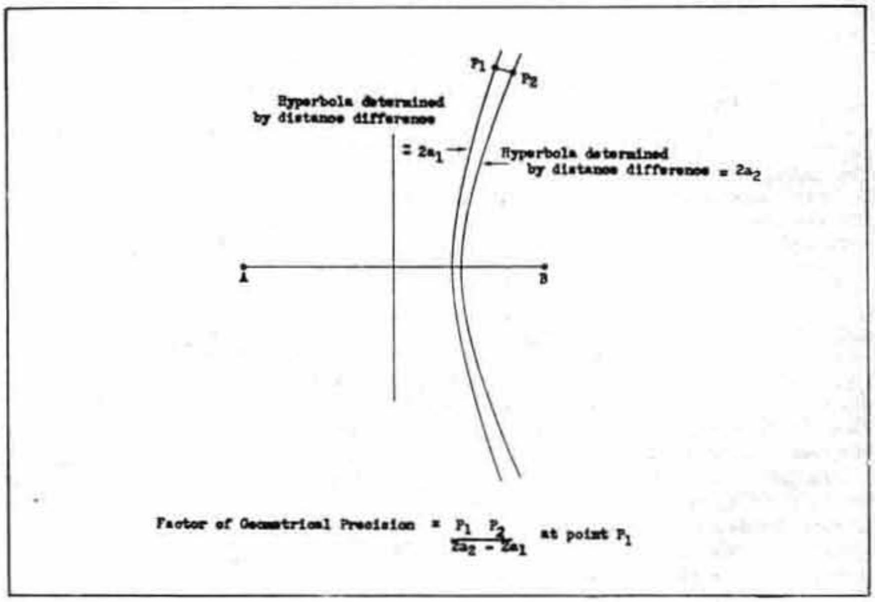


FIGURE 5. *Definition of factor of geometrical precision.*

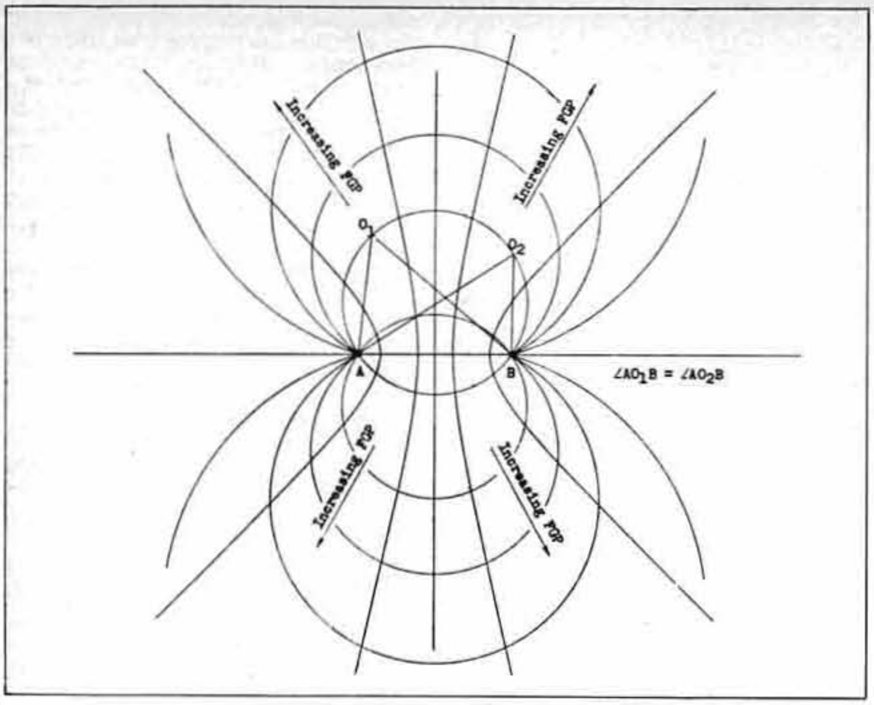


FIGURE 6. *Loci of constant factors of geometrical precision.*

stations are the foci of the system and their separation determines the length of the baseline, and also the family of hyperbolas. It is more convenient at this point to change from distance units to time units, speaking of distances in terms of the number of millionths of a second (microseconds) it takes for a radio signal to travel the particular distance under consideration. A signal requires approximately 6.18 microseconds to travel one mile. Therefore the "time" or "electrical" length of the baseline is the number of miles separating the two stations multiplied by 6.18 and is given the symbol β. The difference in distances from the two stations to the observer now becomes the difference in times of travel of the two signals from the stations to the observer. This time difference is designated by $(T_B - T_A$ where T_B and T_A are the time of travel to the observer from stations B and A respectively. This quantity is positive if the observer is nearer station A, and negative if he is nearer station B. The sign of this time difference eliminates the ambiguity as to which one of the two possible hyperbolas upon which the observer may be located.

In practice, however, it is not possible to determine this sign, as pulses from the two stations are identical in characteristics. In order to resolve this ambiguity in the Loran system, the pulses are not simultaneously emitted from the two stations. The interval of time from the emission of a pulse from station A to the emission of the next pulse from Station B is called the absolute delay and is denoted by D. As the pulses are received by the observer, the time difference, which we shall call TD, is then greater or less than the absolute delay by the same amount that station B is nearer or farther than station A. Stated as an equation this becomes:

$$TD = D + (T_B - T_A)$$

where $(T_B - T_A)$ is positive if B is farther than A and negative if it is nearer than A.

The range of possible values of $T_B - T_A)$ *is from* $+\beta$ to $-\beta$ just as the range of possible values of distance difference was from minus the length of the baseline to plus the length of the baseline. The range of time difference reading is therefore from $D + \beta$ to $D - \beta$, and if D is made greater than β. TD will always be positive. This means that pulse from station A will everywhere in the system be received before the corresponding pulse from station B. However, some means must still be provided to enable the observer to identify the received signals with the respective stations.

One station, A, is designated as the master station and the other station, B, is called the slave station. The slave station is instructed to maintain its transmitted signal in synchronization with that from the master station. The time sequence of pulse as alternately emitted from the pair is *ABABAB*, etc. The interval between successive *A's* or successive *B's* is called the repetition interval, denoted by L. The transmission inter-

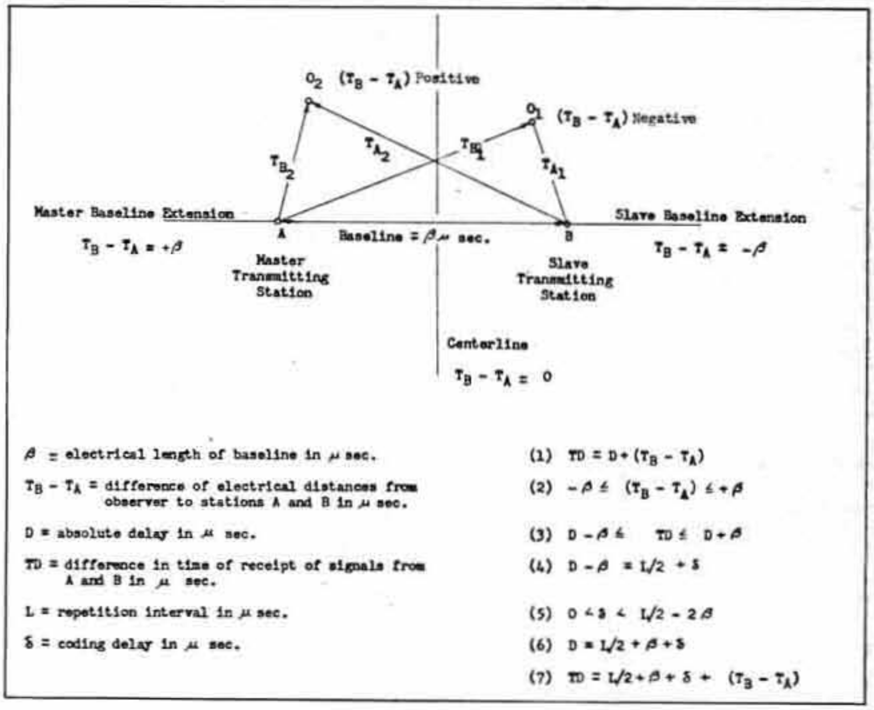


FIGURE 7. *Derivation of Loran equation.*

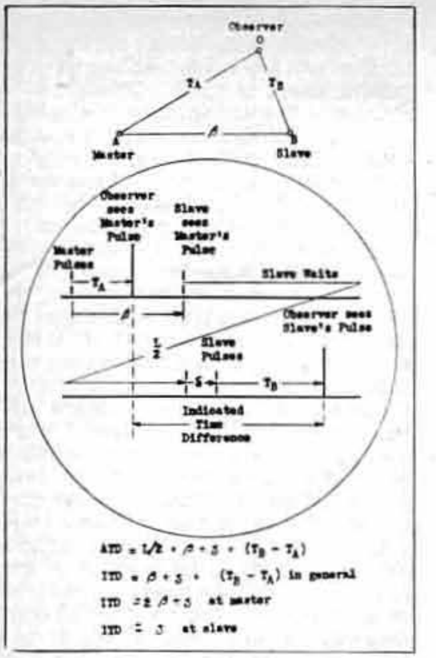


FIGURE 8. *Scope presentation.*

val AB is the same as the absolute delay D, which therefore must be less than L. The reception interval AB is the same as the time difference TD, which varies with the location of the observer. In order that no ambiguity may occur in identifying the received signals, the absolute delay, D, is made of such length that the time difference, TD, will always be greater than one-half the repetition interval, $L/2$, and less than the full repetition interval, L. This makes the interval between reception of the master or A signal and reception of the slave or B signal, everywhere greater than the interval between reception of the slave signal and reception of the next master signal. Stating this in the form of an equation, this condition will be obtained when:

$$D-\beta=L/2+\delta$$

where delta is some arbitrary time interval within the limits zero to $L/2-2\beta$ and is known as the coding delay.

Thus the equation defining the absolute delay, D, for a particular pair of stations is finally:

$$D=L/2+\beta+\delta$$

Then the fundamental Loran equation for time difference is obtained in the form:

$$TD=L/2+\beta+\delta+(T_B-T_A)$$

It is more strictly correct to refer to this expression for time difference as the "actual time difference" inasmuch as the one actually measured by Loran equipment does not include the $L/2$, it being automatically canceled out in the method of measurement. This measured difference is called the "indicated time difference".

See Figure 8.

Loran signals are presented visually to the observer on a cathode ray oscilloscope in Loran receiving equipment. An electron beam sweeps out two equal horizontal traces across the scope, the total time of the two sweeps being equal to the pulse repetition interval, L. The master and slave signals appear as vertical pips on the traces. In this sketch of the observer's scope picture the observer does not see the vertical dotted lines. They have been placed there to mark the sequence of events which take place from the transmission of a pulse by the master station to the receipt of the slave's pulse at the observer's position, and the means by which the measured or indicated time difference is presented on the scope. To follow through on a complete cycle of events, we note that such a cycle is initiated by the transmission of the pulse from the master station. T_A microseconds later the observer sees the master's pulse on his scope. β microseconds after the master has pulsed, the slave station receives the pulse. The slave then waits a period $L/2+\gamma$ microseconds at the end of which interval it transmits its own pulse. T_B microseconds after this, the observer sees the slave pulse on his scope. Since the traces are of length $L/2$ it is apparent that the electron beam in the course of its sweep will be at a point on the lower trace directly beneath the point where the slave sees the master pulse, after the slave has waited $L/2$ microseconds. Simple addition and subtraction of lengths of the trace between pertinent points results in the formula for the indicated time difference. It is this "split trace" presentation, then, which automatically cancels the $L/2$. Of course a single trace of length L could be used for the scope presentation instead of the double or split trace, and the $L/2$ retained. However the former method of presentation is preferable from the point of view of economy in scope size and convenience in the measurement of the time difference. Loran receivers also incorporate provisions for presenting on the scope only the portions of the traces where the two pulses occur and for effectively "blowing-up" the pulses. The pulses, one above the other, may then be collapsed together so that one is superimposed upon the other. Such a matching process, made possible by adjustment of the horizontal position of the lower pulse, affords an accurate means of time difference measurement in conjunction with the various delay and time marking circuits of the Loran receiver.

The timing equipment at each master and slave station also contains an oscilloscope upon which both signals are presented. Referring back to the formula for indicated time difference, we may easily determine what the value of this difference is at each station.

Considering first the master station, A, we see that T_A will be equal to zero and T_B will be simply the electrical length of the baseline, β. Then the time difference which should be read at the position of the master station if the system is in proper operation or synchronization is $2\beta+\gamma$. Now considering the slave station, we find that, in this case, T_B is equal to zero while T_A is equal to β. The measured time difference at the slave station should therefore be equal to γ.

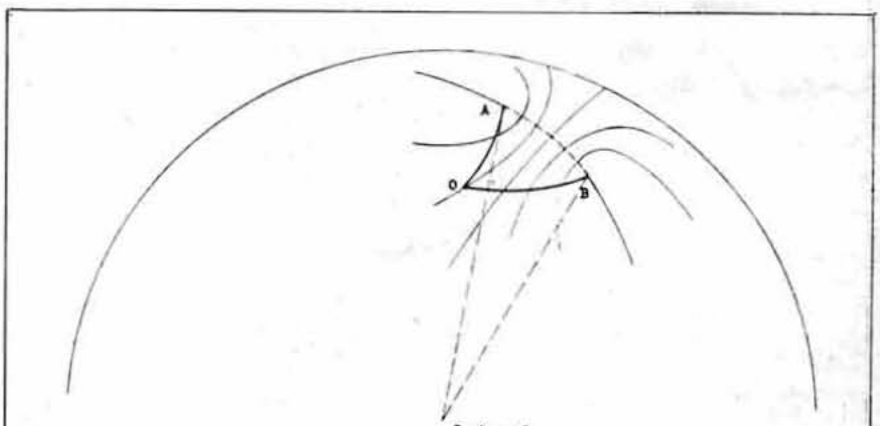


FIGURE 9. *Spherical hyperbolas.*

The slave station is so called because it has the task of maintaining its signal in synchronization with that from the master station. Each station makes periodic readings of its corresponding time difference as a means of checking this. If the master station reading is other than $2\beta+\gamma$, or the slave station reading is other than γ, the system is not in proper synchronization. The slave station then makes the necessary adjustments of its timing equipment to restore the proper reading. Thus the Loran system provides a constant check on its service accuracy since if the readings are correct at the master and slave stations they must be correct throughout the service area.

Now let us turn to look at some of the practical considerations which are encountered in the application of this hyperbolic system to a nonplanar surface such as that of the earth.

See Figure 9.

The hyperbolas discussed up to this point have been plane hyperbolas. The time differences actually measured, however, are the differences of time of travel along the surface of the earth. The hyperbolas used for Loran navigation must therefore be oblate-spheroidal hyperbolas. It is possible to write the equation for spherical hyperbolas in terms of latitude and longitude coordinates. The spherical hyperbolas may then be corrected for oblateness of the earth by suitable correction factors. The primary use for such formulae is for production of Loran charts.

It has been found that solution of the oblate-spheroidal hyperbolas is more complicated than an inverse type solution. For this method, used by the United States Navy Hydrographic Office for Loran charting, Loran readings are computed for points of even latitude and longitude. The distances from the points to the two stations are computed by means of standard formulae for long distances on the surface of the earth, taking into account the oblateness of the earth.

The distances expressed in microseconds are then used in the form

$$ITD=\beta+\gamma+(T_B-T_A)$$

to obtain the Loran reading for the point. Interpolation between computed time differences is used to obtain the latitude and longitude coordinates for the desired whole-numbered time difference curve. The curves are then graphically constructed from a number of such points. Charts covering a 1,500-mile radius may be computed utilizing modern computors to calculate time differences for every 15 minute interval of latitude and longitude in a period of about a week.

To provide temporary Loran charts in the field, the United States Coast Guard utilizes a mobile charting team which produces charts by appropriate distortion of plane hyperbolas. To enable a transformation of hyperbolas from a plane to the earth's surface, a Lamber conformal conic projection chart is used. This type of chart has the advantages of displaying great circles as approximately straight lines, maintaining true directions around any point, and has small distortion. The two transmitting stations are plotted on the blank chart grid chosen for the latitudes to be covered. The linear baseline length is then transferred to an overlay on which a set of plane hyperbolas is constructed utilizing a set of tables giving the desired rectangular coordinate when the tables are entered with the other rectangular coordinate and the accentricity of the desired hyperbola as parameters. For selected points, true time differences are computed utilizing formulas for long distances on the surface of the earth, taking into account the earth's oblateness. With the baseline of the plane hyperbolas properly registered on the map grid, the computed Loran readings for the selected points are compared with readings obtained by interpolation from the plane hyperbolas. Corrections are then made to the plane hyperbolas by moving and distorting them in such a direction that errors are minimized. A master chart is then produced by tracing the map grids and the corrected hyperbolas. Finally, necessary land masses are added by transformation from the other maps.

The production of accurate Loran charts presupposes an accurate knowledge of the geographic coordinates of the two Loran transmitting stations. Due to the remote location of many Loran stations this cannot always be obtained. In many cases the Loran system has provided the only information for tying together the geodetic datum between remote areas. This information is obtained by carefully comparing the electronically measured baseline length with the computed geodetic length.

See Figure 10.

Since the baseline extension time differences are the maximum and minimum values of time difference in the system, an aircraft flying across the baseline extensions will observe time differences that approach a maximum or minimum value and then recede from that value. The observed time differences are plotted versus time of observation and the maximum or minimum values are obtained. The minimum time difference at the slave baseline extension is the true coding delay, γ, introduced by that station. Deviations from computed coding delays can only be introduced by faulty synchronization at the slave station. From the maxi-

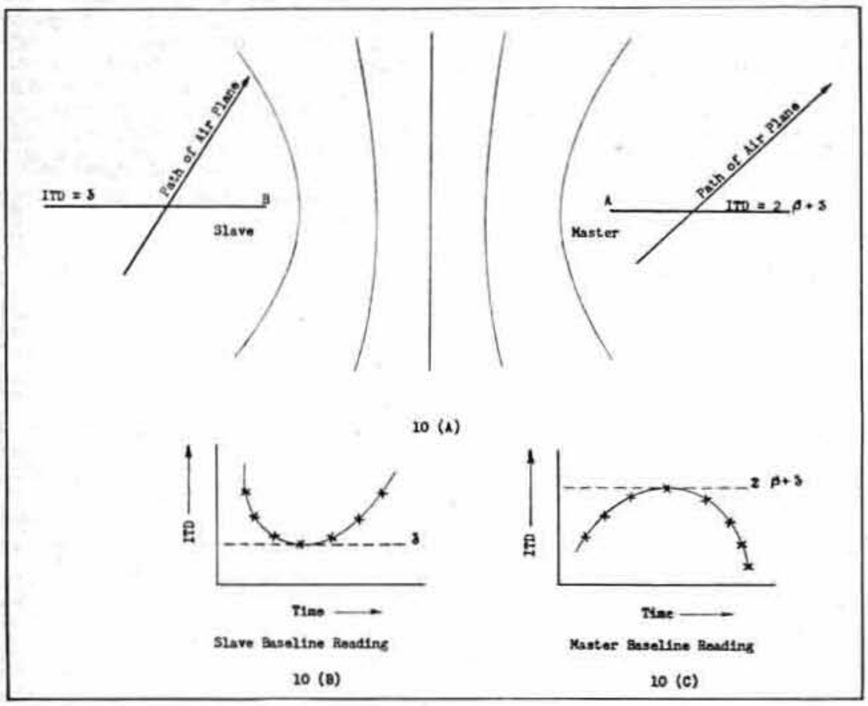


FIGURE 10. *Loran baseline length system check.*

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mum baseline extension time difference at the master station, the observed coding delay is subtracted. The remainder divided by 2 is then the electrically observed baseline length β. Deviation from the computed value of β is an indication that the coordinates of one or both stations are incorrect. As many observations of time differences as is practicable are made at monitor stations located in the service area. The pattern of deviations observed from computed time differences is noted on the chart and analyzed. On the basis of this analysis, the assumed geographic positions of the stations are modified to reduce the error noted at each monitor station. In the interim, if charts have already been issued, correction chartlets are issued to users to give correction factors required in the various sections of the service area.

The Loran system today is widely used by aircraft and shipping over a large portion of the earth. Its high degree of accuracy and the speed and ease of use in all conditions of weather make it a valuable adjunct to modern navigation. Most mathematical computations are completed at the time the stations are installed and the system charted while the remaining computations are automatically completed by the Shipboard Loran Receiver-Indicator. In summary, a mechanical adjustment is made to align pulses, the indicated time difference is read from a dial, a line of position is immediately found by reference to a Loran chart and we have accurate long distance navigation without mathematics.

TOO BUSY

The tug pushing her tow proceeded slowly through the waters of the canal. At the vanishing point of the canal there appeared an object that caused the helmsman to become, at first, a little curious. As the object increased in size it was observed to be a small fishing boat of the common type, approaching slowly from ahead.

The helmsman on the tug intently watched the vessel's approach until both vessels closed. At the closing point the fishing boat suddenly veered across the path of the tug. The forward starboard corner of the barge smashed into and completely passed over the fishing boat. The sole occupant of the fishing boat was thrown into the water by the force of the impact.

In the investigation of the casualty it was brought out that the sole occupant of the fishing boat was "too busy and intent upon culling crabs;" that he was not aware of his boat's heading.

Your Fact Forum

Q. In a motor lifeboat, how does the torque of the propeller affect the boat when the ordinary right-handed marine engine is used?

A. With the helm amidship, and the engine running ahead, the boat's head gradually goes to port. With the helm amidship and engine going astern, the boat's stern goes to port rapidly. A small amount of right rudder is necessary to counteract this tendency when going ahead. As the effect of the torque is greater when going astern, advantage may be taken of this tendency when maneuvering in close quarters, by turning the boat to the right. By going ahead with right rudder, and astern with left rudder, and repeating the process, the stern is sheered rapidly to port and the boat is quickly turned. In handling lifeboats, it is best to use the engines at a moderate speed, both ahead and astern, while maneuvering in order to get the maximum benefit in steering of the action of the propeller stream against the rudder.

Q. What is the principal cause of the tides?

A. The moon's attraction upon the water of the earth.

Q. Is the action of the rudder on a motor lifeboat more pronounced than on a large vessel?

A. Yes, because of comparative rudder areas. A motor lifeboat can be steered when going astern much better than a vessel can.

Q. Describe the general trend of the Gulf Stream from the Florida Straits and give its approximate velocity?

A. From the Straits of Florida north to latitude 31 degrees, thence ENE. to latitude 32 degrees, then a little north of NE. of Cape Hatteras. The maximum current is 11 to 20 miles outside the 100-fathoms curve. Its velocity varies from 3 to 5 knots off Fowey Rocks, to 1.5 knots off Hatteras.

Q. What is meant by a "Rhumb line?"

A. A line on the earth's surface which intersects all meridians at the same angle; the loxodromic curve.

Q. What is a Psychrometer?

A. The Psychrometer is an instrument used to measure the humidity of the air.

Q. Where would you find the time of slack water after high or low water in any given port of the United States?

A. In the "Current Tables," a small supplement to the "Tide Tables" published by the U. S. C. and G Survey.

Q. What is meant by the augmentation of the moon's semidiameter?

A. This is the increase in its semidiameter due to the observer being brought nearer to it as its altitude increases.

Q. Why is the sun hottest when it is directly overhead?

A. Because then its rays pass through fewer layers of the earth's atmosphere.

Q. What is meant by "waxing moon" and "waning moon"?

A. A waxing moon is a crescent moon with the open side to the east; in a waning moon the open side is toward the west.

Q. State under what circumstances you may expect the deviation to change.

A. It will change by altering a course steered for a long time, also by change of latitude, cargo of iron, collision, stranding, shock from heavy seas, heeling over, gunfire, alterations in structure of the ship, in some cases shifting of ventilators or booms. It will also change in a new ship.

Q. Which moves first when the rudder is put over, the ship's head or stern?

A. The ship's stern moves first.

Q. Where is the pivoting point of the vessel?

A. About one-third of her length abaft the stem.

Q. Name seven different means of plotting the ship's position.

A. 1. By dead reckoning.

2. By terrestrial bearings.

3. By observation of celestial bodies.

4. By combination of celestial and terrestrial observations.

5. By a chain of soundings and the course.

6. By radio-compass bearings.

7. Radio bearing and celestial line of position.

Q. What is the difference between the expressions, "visibility of a light" and the "circle of visibility."

A. "Visibility of a light" refers to the extreme distance which the light is visible at any height. The candlepower of the light is the determining factor. "Circle of visibility" refers to the distance at which a light is visible when the height of eye is 15 feet above sea level. The height of the light and the height of the observer are the determining factors in "circle of visibility."

MERCHANT FLEETS OF THE WORLD

Seagoing Steam and Motor Merchant Vessels of 1,000 Gross Tons and Over as of Dec. 31, 1951

(Excludes vessels on the Great Lakes and Inland Waterways and Special Types such as channel vessels, icebreakers, cable ships, etc., and merchant vessels owned by any military force)

[Tonnage in thousands]

Flag	Total—all types			Combination passenger and cargo			Combination passenger and cargo—refrigerated			Freighters			Freighters—refrigerated			Bulk carriers			Tankers (includes whaling tankers)		
	No.	Gross tons	Dwt. tons	No.	Gross tons	Dwt. tons	No.	Gross tons	Dwt. tons	No.	Gross tons	Dwt. tons	No.	Gross tons	Dwt. tons	No.	Gross tons	Dwt. tons	No.	Gross tons	Dwt. tons
Total—all flags	13,646	78,821	110,655	1,254	9,213	7,369	64	778	610	9,189	46,651	69,356	302	1,867	2,079	572	1,782	2,832	2,265	18,530	28,409
United States [1]	3,464	25,726	37,090	[2] 258	2,302	2,030	7	49	32	2,633	18,477	27,196	46	271	288	52	332	639	468	4,295	6,905
British Commonwealth	3,031	18,844	24,757	322	2,786	1,939	43	640	497	1,748	9,391	13,779	129	1,152	1,322	235	553	810	554	4,322	6,410
United Kingdom	2,532	16,721	21,917	225	2,372	1,632	42	636	494	1,415	7,978	11,682	126	1,141	1,310	203	452	661	521	4,142	6,138
Canada	135	672	874	33	106	45				76	408	593				2	10	12	24	148	224
Australia	121	428	583	15	89	56				87	277	431				19	62	96			
New Zealand	52	184	221	6	34	14	1	4	3	38	128	179				6	15	20	1	3	5
India	81	398	577	15	68	82				64	322	483				1	5	7	1	3	5
Union of South Africa	13	76	108	1	10	12				12	66	96									
Pakistan	21	115	154	2	17	7				15	81	120	1	3	4	1	5	8	2	9	15
Other	76	250	323	25	90	91				41	131	195	2	8	8	3	4	6	5	17	23
Argentina	136	868	1,122	20	144	103	3	31	29	63	364	544	6	18	20	3	5	7	41	306	419
Belgium	77	430	590	12	106	107	1	7	10	54	244	367	1	3	3	1	1	2	8	69	101
Brazil	175	637	879	30	120	121				120	439	650				4	5	6	21	73	102
Bulgaria	4	14	22							4	14	22									
Burma	4	10	19							4	10	19									
Chile	41	161	217	7	31	37				20	81	108				14	49	72			
China	141	399	558	10	30	20				102	306	453	1	3	4	5	10	15	23	50	66
Colombia	12	33	46							11	32	44							1	1	2
Costa Rica	15	79	120	2	4	4				12	68	106							1	7	10
Cuba	12	27	36	1	3	2				10	23	33				1	1	1			
Denmark	309	1,227	1,782	26	87	75	2	3	3	228	800	1,188	10	21	28	11	27	41	32	289	447
Dominican Republic	2	5	4	1	3	2				1	2	2									
Ecuador	6	15	21	1	1	1				4	13	18							1	1	2
Egypt	20	81	83	13	53	59				7	28	24									
Finland	188	498	757	4	8	4				163	404	627				12	31	45	9	55	81
France	543	3,109	3,934	72	679	439	2	20	17	308	1,443	2,087	22	79	65	49	152	214	90	736	1,112
Germany	274	841	1,316	9	38	55				230	642	1,016	3	9	11	17	51	80	15	101	153
Greece	215	1,200	1,831	9	46	27				183	1,022	1,592				9	28	48	14	104	164
Guatemala	1	3	3							1	3	3									
Honduras	79	414	576	2	6	3	2	11	9	49	203	302	16	64	57				10	130	205
Hungary	2	2	3							2	2	3									
Iceland	13	32	36	3	7	4	1	2	2	6	14	22	3	9	8						
Indonesia	7	33	38	1	6	3				3	15	22	1	8	8				2	4	5
Iran	1	7	10							1	7	10									
Ireland	12	36	54							9	24	35				3	12	19			
Israeli	21	93	128	3	13	10				18	80	118									
Italy	488	2,862	3,982	60	507	404	1	11	9	310	1,558	2,362	8	28	29	18	70	118	91	688	1,060
Japan	465	2,087	3,082	23	100	99				389	1,601	2,402	3	22	33	4	13	21	46	351	527
Korea	4	8	12	2	3	4				2	5	8									
Liberia	78	726	1,167							41	262	394							37	464	773
Mexico	30	150	216							9	20	22	1	4	4	1	6	8	19	120	182
Netherlands	500	2,882	3,786	95	698	649				294	1,564	2,249				2	4	7	109	616	881
Nicaragua	3	5	7							3	5	7									
Norway	963	5,470	8,294	32	130	97	2	4	2	575	2,228	3,486	21	66	71	16	39	61	317	3,003	4,577
Panama	545	3,605	5,386	30	222	171				294	1,496	2,243	6	20	21	30	109	185	185	1,768	2,766
Peru	22	85	114	4	22	23				15	55	79				1	3	5	2	5	7
Philippines	22	88	119	4	11	8				16	73	106				2	4	5			
Poland	58	233	328	1	14	6				45	180	269	3	10	12	7	14	20	2	15	21
Portugal	92	393	528	19	124	109				66	217	343							7	52	76
Rumania	8	37	44	2	10	4				6	27	40									
Siam	3	4	6							2	3	4							1	1	2
Spain	268	971	1,311	37	187	151				192	597	901	1	6	6	12	35	52	26	146	201
Sweden	576	2,032	3,039	31	202	183				438	1,161	1,850	10	36	42	44	188	282	53	445	682
Switzerland	18	83	132							16	69	110							2	14	22
Syria	1	1	2							1	1	2									
Turkey	111	386	520	30	123	113				75	233	360				1	1	2	5	29	45
Uruguay	8	48	73	2	10	11				4	18	29							2	20	33
U. S. S. R.[3]	471	1,455	1,896	67	344	250				346	914	1,366	11	38	47	15	28	44	32	131	189
Venezuela	52	154	213	3	4	4				10	28	35				2	7	15	37	115	159
Yugoslavia	55	232	367	6	29	38				46	185	299				1	4	8	2	14	22
Total	91	545	823	1	5	5				87	522	790				2	11	17	1	7	11
Philippines	8	27	38							8	27	38									
U. S. S. R.	83	518	785	1	5	5				79	495	752				2	11	17	1	7	11

[1] Includes U. S. Government-owned vessels transferred to the following flags under lend-lease or other agreements and still remaining under these registries by subsequent arrangements. For purposes of this table they have been excluded from those registries.
[2] Includes transports, hospital ships, etc.
[3] Includes Estonian and Latvian tonnage.

Source: Maritime Administration, Department of Commerce.

NOTE: Individual tonnage figures are not additive since the detail figures have been rounded to the nearest thousand.

Table reprinted from the August 1952 issue of the Log.

SAFETY HINTS

The safety of a vessel demands that everything be shipshape. Your safety demands that particular attention be given to those items provided for the better security of life. When an emergency develops, it is then usually too late to start preparations. Test yourself on the following questions. See how many you can answer with a yes.

GENERAL SAFETY CHECKUP

HATCHES:

Are tarpaulins in good condition, neatly spread and tucked at corners and secured with battens and wedges to maintain hatches watertight?

WATERTIGHT DOORS:

Are they kept securely closed and "dogged" except when persons are actually passing through the openings?

WEATHER DOORS:

Are they kept securely closed when weather conditions so demand?

AIRPORTS:

Are gaskets and "dogs" in good condition so that ports can be closed down tight if weather conditions so demand?

Are the deadlight covers of proper fit and kept at hand ready for use?

DECK CARGO:

Are all the lashings taut and in good condition?

Are all the chocks and shores in place and secured?

FIRE-FIGHTING EQUIPMENT

GENERAL:

Is equipment provided as required by regulations?

FIRE HOSE:

Is the hose in good condition? Is it properly racked and attached to the hydrant? Are the valve handles, valves and spindles in good order? Are the clamps or pins in the racks free? If in cabinets, can the door latch be readily opened? Are gaskets kept at hand, of proper fit, and in good order? Are the nozzles and spanners in place and ready for use? Is hose readily accessible?

PORTABLE FIRE EXTINGUISHERS:

Are the hoses in good condition? Are extinguishers properly filled and located in a place where they can be easily seen and readily removed for use? Are extinguishers of the proper type for the hazard involved?

FIRE-EXTINGUISHING SYSTEM:

Are the control valves legibly marked, in good order, and accessible for prompt use? Are fire pumps in good operable condition? Are strainers clean?

FIRE AXES:

Are they in a position where they are readily accessible and handy for use? Are handles smooth and free of rough edges? Do the handles fit snugly to the heads, and are the cutting edges smooth and sharp?

AIR AND GAS MASKS:

Are they in good condition, ready for immediate use, and located where they will be easily obtainable when needed in an emergency?

OXYGEN-BREATHING APPARATUS:

Is there sufficient oxygen in the cylinder? Has the apparatus been tested for leaks in the connections? Is the crew familiar with the proper operation of this equipment?

"WE MISPLACED OUR REGULAR BREECHES-BOUY"

Courtesy Maritime Reporter.

EMERGENCY STEERING GEAR

Are the necessary tools at hand and is all operating gear in good working condition, so as to connect steering gear promptly?

LIFEBOATS

EQUIPMENT:

Was equipment thoroughly examined in port? Are you checking it frequently at sea?

Are the oars, boathooks, etc. in good condition and properly lashed in boats?

Are the rowlocks properly secured and ready for slipping into the sockets?

Does the rudder fit properly into the gudgeons, and is it properly attached to the boat with a lanyard to prevent loss?

Are all the sails and attached gear in good condition? Are they dried out and set occasionally for training?

WATER AND PROVISIONS:

Are the hermetically sealed cans containing fresh water in good condition?

Are the provision containers hermetically sealed, in good condition and watertight?

SECURITY AND READINESS:

Are the boat painters properly attached and in good condition, also of proper length?

Are the strong backs properly secured?

Are frapping lines provided for lifeboat falls?

Are the boat gripes properly secured and the falls moderately taut?

Is there a hammer or bar ready at hand to be used for promptly releasing the pelican hooks on the gripes securing the boats?

Are the crank handles for the davit arms in place and of proper fit?

Is all excess water drained from boats and the drains kept clear?

Are the turns of the boat fall properly placed on the lowering bitts?

Are the lifeboat fall reels clear for running?

Has a little slack been left in the span between the davit heads to which the life lines are attached?

Has the motorboat engine been operated at the required intervals?

Has the hand-propelling gear been operated and lubricated frequently (if the boat is so fitted)?

Is miscellaneous gear on the boatdeck kept clear of the lifeboats?

Are the life lines from the davit heads of proper length?

RING BUOYS:

Are all the ring buoys properly distributed and stowed ready for immediate use?

WATER LIGHTS:

Are all the water lights properly attached?

LIFE PRESERVERS

Are they at hand, in good condition, and ready for each individual's immediate use?

FLASHLIGHTS

Are all emergency flashlights in good order and will they light?

EMERGENCY ESCAPES

Are they all free and clear of obstruction? Are emergency escapes properly marked and readily visible?

THE SUPERVISOR

One of the important duties of a supervisor is to prevent accidents from occurring in his department. Occasionally, however, certain actions of supervisors might contribute directly to accidents to their men.

The wise supervisor will study over carefully the following list of ways in which he might contribute to an accident. He will then watch himself carefully to see that he does none of them.

A supervisor might contribute to accidents by:

1. Failing to give orders or giving wrong orders.
2. Not instructing his men with reference to the hazards of their work.
3. Failing to insist on his men using approved safe methods.
4. Not supplying proper tools.
5. Supplying tools not in proper condition (knives dull, etc.).
6. Allowing men under the influence of liquor to remain on the job.
7. Not investigating all accidents, learning all that happened, and correcting the unsafe conditions or practices shown to exist.
8. Distracting the attention of a man when he is working with or around machinery or sharp-edged tools. This distraction may consist of calling to or speaking to a man from behind or from such a position that he must turn to the speaker.
9. Permitting one man to lift or carry a load that should be handled by two men.
10. Permitting the use of broken or chipped crockery.
11. Leaving acids, lye, etc., around in improperly marked containers, or where they can be gotten by inexperienced personnel.
12. Using u n d u e conversation, permitting the use of foul language, or making the worker nervous by loud and abusive language when things go wrong.
13. Nagging his men.
14. Failing to follow his own safety instructions.
15. Maintaining an insolent and domineering attitude towards those under him.

Courtesy Marine Safe Practices Pamphlet No. 58, dated July, 1952.

ACCIDENT PREVENTION BUREAU OF PACIFIC MARITIME ASSOCIATION,
16 California Street,
San Francisco 11, Calif.

MOPE and DOPE

"Mope, what's a accidunce?"

CARBON TETRACHLORIDE

A recent incident involving the use of carbon tetrachloride in a confined area resulted in 1 fatality and the hospitalization of 10.

Carbon tetrachloride was used to clean machine equipment in a confined area. The first symptoms resulting from exposure to this toxic solvent did not appear until 1 week later when 1 person died and 10 were hospitalized within the following 24 hours.

The inherent hazards of carbon tetrachloride have been stressed many times, whether used as a fire-extinguishing agent or for any other purpose. Unfortunately, some of the personnel directing operations involving the use of carbon tetrachloride are not always informed of these hazards or perhaps they do not take all the necessary precautions.

Carbon tetrachloride is widely used and has been the cause of a considerable number of cases of poisoning. Prolonged, excessive, or repeated exposures to the compound are hazardous and may result in serious injury or death. It is easily absorbed by the mucous membranes, the lungs, and to some extent, by the skin. In the presence of water, especially at elevated temperatures, carbon tetrachloride is corrosive. In the presence of open flames or when exposed to hot objects, carbon tetrachloride decomposes to form phosgene, a deadly gas, and hydrochloric acid.

It can cause injurious effects due to inhalation, ingestion or by prolonged or repeated contact with the skin. The toxic effects can be either acute or chronic. The former is brought about by a single exposure to a heavy concentration of carbon tetrachloride. The latter is the result of repeated exposure to lower concentrations.

Symptoms may not appear until days after the initial exposure.

One case was reported of a worker who had only a five minute exposure to a heavy concentration from a fire extinguisher. Nine days later he developed convulsions, and other complications. Fortunately, he recovered.

The hazard of using a carbon tetrachloride extinguisher on a fire is greatest when the liquid is discharged on slow burning or smouldering electrical equipment, automobile motors or any metal object involved by fire. Since these fires are small and extinguished without any appreciable loss, personnel are prone to remain in the area and will be exposed to the deadly effects of phosgene. All personnel should be removed from the vicinity, and the area well ventilated. The chemical reaction of carbon tetrachloride on hot metals is rapid decomposition with the production of phosgene. Fire fighting personnel are enjoined to use the self contained breathing apparatus when working in areas that have been exposed to phosgene gas.

Persons poisoned by exposure to carbon tetrachloride or to phosgene should be immediately removed from the contaminated atmosphere. In every case a physician should be called promptly. If breathing has stopped, artificial respiration should be used.

Properties of carbon tetrachloride:
- Flash point: None (nonflammable).
- Odor: Pleasant, aromatic.
- Color: Clear, colorless.
- Natural state: Liquid.
- Weight of vapor with relation to air: 5.32 times heavier.
- Weight of liquid with relation to water: 1.58 times heavier.

Precautions to be taken when used:
- Use with adequate ventilation.
- Avoid prolonged or repeated breathing of vapor.
- Avoid prolonged or repeated contact with skin.
- Do not take internally.

ORGANIZATION IS A PREREQUISITE FOR PREVENTION OF ACCIDENTS

(Courtesy of Seamen's Safety Guide—August 1952)

There are many points of view in regard to preventing accidents aboard ship. The injured man blames some one besides himself; the injured man's immediate boss finds a dozen or more reasons why he (the boss) shouldn't be blamed for the accident. Probably all licensed officers think of a seaman as a self-propelled, self-handling unit, possessing some sort of an individuality, and unthinkingly trust him to do certain things according to certain rules of action.

But the company and ship have only one point of view—viz—"Accidents, not caused by an act of God, are man-made and can be prevented by man; therefore, why was not the preventable accident prevented?"

Every Master and licensed officer knows that man-made accidents are not prevented on account of one or more of the following reasons:

(1) Tolerated unsafe gear and equipment;
(2) Tolerated unsafe working places or conditions;
(3) Tolerated unsafe practices or methods;
(4) Tolerated unsafe acts of workmen.

The ship then, through its Master and his officers must accept the responsibility for the things that go wrong on it, and an unprevented accident must be considered as indicative of something wrong. Accordingly, some one has failed in the proper performance of his duty when a mistake has been permitted. It is the present policy of certain operating managers to find out why the mistake was permitted to occur and what officer was responsible for the mistake.

The Master is responsible for the ship and its operation. He delegates certain authority to each of his department heads. With authority goes responsibility. With responsibility goes the selection, assignment, training, disciplining of his subordinates and men; goes the development of safe and efficient methods of doing each job, be it a major or minor one; goes the establishment and maintenance of safe and efficient working places; goes the selection and maintenance of gear.

When the unprevented accident comes to the Master's attention, he need accept no excuse, nor alibi, nor reason, because if he insists on facts and uses his knowledge, authority and prerogative to obtain them, he can assign responsibility for nonprevention and make such corrections as may be required to prevent recurrences.

No accident prevention record was ever attained without organization. No coordinated effort is effective without organization. No ship organization can be created except by the authority and initiative of the Master.

Amendments to Regulations

TITLE 46—SHIPPING

Chapter I—Coast Guard, Department of the Treasury

Subchapter O—Regulations Applicable to Certain Vessels During Emergency

[CGFR 52-42]

PART 154—WAVERS OF NAVIGATON AND VESSEL INSPECTION LAWS AND REGULATIONS [1]

PART 155—LICENSED OFFICERS AND CERTIFICATED MEN. REGULATIONS DURING EMERGENCY

ALIENS SERVING AS LICENSED OFFICERS ON MERCHANT VESSELS

The purpose of this document is to revoke the waiver order designated as 46 CFR 154.15, as well as 33 CFR 19.15, and the regulations in 46 CFR Part 155, regarding employment of aliens as watch officers on United States merchant vessels and the qualifications for alien officers.

It has been determined upon investigation that there is sufficient experienced personnel in the merchant marine industry to meet the requirements of certain navigation and vessel inspection laws relating to manning of merchant vessels and to meet the citizenship requirements for watch officers in the United States merchant marine. Therefore, the waiver order designated as 46 CFR 154.15, as well as 33 CFR 19.15, and the regulations in 46 CFR Part 155 relating to aliens serving as licensed officers on merchant vessels are no longer necessary. It is hereby found that compliance with the notice of proposed rule making, public rule making procedure thereon, and effective date requirements of the Administrative Procedure Act is contrary to the public interest.

By virtue of the authority vested in me as Commandant, United States Coast Guard, by an order of the Acting Secretary of the Treasury, dated January 23, 1951, identified as CGFR 51-1, and published in the Federal Register dated January 26, 1951 (16 F. R. 731), the following waiver order and regulations are revoked effective upon the date of publication of this document in the Federal Register.

1. Section 154.15 *Employment of aliens as watch officers on United States merchant vessels* is revoked.

[1] Also codified as 33 CFR Part 19.

2. Sections 155.01-1 to 155.10-50, inclusive, which comprise the entire Part 155, are revoked.

(Secs. 1, 2, 64 Stat. 1120; 46 U. S. C. Supp. note prec. 1)

Dated: August 11, 1952.

[SEAL] MERLIN O'NEILL,
Vice Adm., U. S. Coast Guard, Commandant.

[F. R. Doc. 52-9077; Filed, Aug. 15, 1952; 8:59 a. m.; 17 F. R. 7495—8/16/52]

Equipment Approved by the Commandant

ELECTRICAL APPLIANCES

The following list supplements that published by the United States Coast Guard under date of May 15, 1943, entitled "Miscellaneous Electrical Equipment Satisfactory for Use on Merchant Vessels," as well as subsequently published lists and is for the use of Coast Guard personnel in their work of inspecting merchant vessels. Other electrical items not contained in this pamphlet and subsequent listings may also be satisfactory for marine use, but should not be so considered until the item is examined and listed by Coast Guard Headquarters. Before listings of electrical appliances are made it is necessary for the manufacturer to submit to the Commandant (MMT), United States Coast Guard Headquarters, Washington 25, D. C., duplicate copies of a detailed assembly drawing, including a material list with finishes of each corrosive part of each item.

APPROVAL OF EQUIPMENT

By virtue of the authority vested in me as Commandant, United States Coast Guard, by Treasury Department Order No. 120, dated July 31, 1950 (15 F. R. 6521), and in compliance with the authorities cited below, the following approvals of equipment are prescribed and shall be effective for a period of five years from date of publication in the Federal Register unless sooner canceled or suspended by proper authority:

BUOYANT CUSHIONS, KAPOK, STANDARD

Termination of Approval No. 160.007/79/0, Standard kapok buoyant cushion, U. S. C. G. Specification Subpart 160.007, manufactured by Greenwood Cowan and Platt, 949 Asbury Avenue, Ocean City, N. J. (Approved Federal Register dated April 13, 1949.)

Termination of Approval No. 160.007/83/0, Standard kapok buoyant cushion, U. S. C. G. Specification Subpart 160.007, manufactured by O'Keefe's Auto Top Shop, 6217 Baltimore Avenue, Yeadon, Pa. (Approved Federal Register dated July 27, 1949.)

Termination of Approval No. 160.007/98/0 Standard kapok buoyant cushion, U. S. C. G. Specification Subpart 160.007, manufactured by Crawford Cushion Mfg. Co., 1081 West View Drive SW., Atlanta, Ga. (Approved Federal Register dated January 19, 1951.)

(R. S. 4405, 4491, 54 Stat. 164, 166, as amended; 46 U. S. C. 375, 489, 526e, 526p; 46 CFR 25.4-1, 160.007)

Manufacturer and description of equipment	Location apparatus may be used				Date of action
	Passenger and crew quarters and public spaces	Machinery, cargo, and work spaces	Open decks	Pump rooms of tank vessels	
Abell Elevator Co., Louisville, Ky.					
Limit switch for use with lifeboat winches, control circuit type, 2-pole, waterproof, bronze enclosure, type AL-30 v., 10 a., 550 v. a. c., 5 a., 500 v. d. c., Dwg. no. 4332-2, Rev. 4 (Drain opening and plug or valve to be provided at installation)	x	x	x	----------	6/5/52
The Carlisle & Finch Co., Cincinnati, Ohio					
Searchlight, 19", incandescent, 1,000 watts, 115 v., distant mechanical control, Dwg. No. 2392, dated 5/27/52	x	x	x	----------	6/5/52
Cutler-Hammer, Inc., Milwaukee, Wis.					
Emergency disconnect switches for lifeboat winch control, spraytight, cat. no. 4101H4001, 2-pole, 30 a., 5 h. p., 250 v. d. c.					
Cat. no. 4101H4011, 3-pole, 30 a., 10 h. p., 440 v. a. c.					
Cat. no. 4101H4002, 2-pole, 60 a., 10 h. p., 250 v. d. c.					
Cat. no. 4101H4012, 3-pole, 60 a., 25 h. p., 440 v. a. c., Dwg. No. C95-358, Rev. B (Drain opening and plug or valve to be provided at installation)	x	x	x	----------	5/12/52
Emergency disconnect switch for lifeboat winch control, splashproof, Cat. no. 4101H4003, 2-pole, 100 a., 20 h. p., 250 v. d. c., Dwg. no. C95-359, Rev. B (Drain opening and plug or valve to be provided at installation)	x	x	x	----------	5/12/5

Manufacturer and description of equipment	Location apparatus may be used				Date of action
	Passenger and crew quarters and public spaces	Machinery, cargo, and work spaces	Open decks	Pump rooms of tank vessels	
Cutler-Hammer, Inc., Continued:					
Emergency disconnect switch for lifeboat winch control, splashproof, Cat. nc. 4101H4004, 2-pole, 200 a., 40 h. p., 250 v. d. c., Dwg. no. C95-360, Rev. B (Drain opening and plug or valve to be provided at installation)	x	x	x	----------	5/12/52
Electro-Mechanical Co., Portland, Oreg.					
Emergency disconnect switch for lifeboat winch control, 2-pole or 3-pole, 100 a., 25 h. p., 250 v. d. c. or 600 v., 3-phase a. c., Dwg. no. D-52-1, Alt. 2 (Drain opening and plug or valve to be provided at installation)	x	x	x	----------	5/20/52
Master switch for use with lifeboat winches, 450 v. a. c., 250 v. d. c., Dwg. no. D-52-2, Alt. 2 (Drain opening and plug or valve to be provided at installation)	x	x	x	----------	6/9/52
C. C. Galbraith & Son Electric Corp., New York, N. Y.					
Limit switch for use with lifeboat winches, control circuit type, 2-pole, 450 v. a. c., 250 v. d. c., Dwg. no. LS-1, Alt. 0 (Drain opening and plug or valve to be provided at installation)	x	x	x	----------	5/2/52
Hynes Electric Heating and Process Division of Martin-Quaid Co., Philadelphia, Pa.					
Multipass lubricating oil heaters, type FDVM, for De Laval centrifuges, Dwgs. nos. M-375-5, Rev. 4, Layout; M-376-5, Rev. 4, Assembly and M-507-1, dated 4/2/52, Wiring Diagram	x	x	----------	----------	5/29/52
Henschel Corp., Amesbury, Mass.					
Whistle switch, w. t., types A and B, 115 v. a. c. or d. c., Dwg. no. 60-134, Alt. 1	x	x	x	----------	6/11/52
Shaft speed indicator, with 8-figure counter, types AC-B and AC-P, 115 v. a. c., and types DC-B and DC-P, 115 v. DC., type B with illumination; type P without illumination; Dwg. no. 10-1057, Alt 3	x	x	----------	----------	6/13/52
Shaft speed indicator, with 8-figure counter, types AC-B and AC-P, 115 v. AC, and types DC-B and DC-P, 115 v. DC.; type B with illumination; type P without illumination; Dwg. no. 10-1057-1, Alt 3	x	x	----------	----------	6/13/52
Koehler Manufacturing Co., Marlboro, Mass.					
Portable hand lamp, with self-contained battery. Wheat safety lamp, Model 271	x	x	x	x	5/28/52
Lovell-Dressel Co., Inc., Arlington, N. J.					
Flanged juction box, aluminum, without cover, (for use with bulkhead mounted fixture) Cat. no. 2093	x	x	x	----------	5/5/52
Blinker light, Cat. no. 958 and anchor light, Cat. no. 955, w. t., Dwg. no. M-5484, Alt. 0	x	x	x	----------	5/16/52
Pump room bulkhead lighting fixture, waterproof, Cat. no 4150, one 100-watt lamp, and Cat. no. 4151, one 150-watt lamp, Dwg. no. M-5182, Alt. 4	x	x	x	----------	5/26/52
Receptacle, single, w. t., angle type- 2-pole, 3-wire, grounded, 10 a., 250 v., 20 a., 125 v., Dwg. no. M-5465, Alt. 2	x	x	x	----------	7/2/52
Switch, w. t., single-pole, 10 a., 250 v. max., Cat. no. 2718, Dwg. no. M-5458, Alt. 2	x	x	x	----------	7/30/52
Plug and receptacle, w. t., 2-pole, 3-wire, grounded Cat. no. 3800 plug and 3812 receptacle, Dwg. no. M-5460, Alt. 4	x	x	x	----------	7/30/52
Switch and single receptacle, w. t., rectangular, 2-pole, 3-wire, grounded, Cat. no. 3805 with 1-pole switch; Cat. no. 3806 with 2-pole switch, 10 a., 250 v. max., Dwg. no. M-5470, Alt. 3	x	x	x	----------	7/230/5
Switch and double receptacle, w. t., 2-pole, 3-wire, grounded, receptacle Cat. no. 3808 with 1-pole switch, Cat. no 3809 with 2-pole switch 10 a., 250 v. max., Dwg. no. M-5471, Alt. 4	x	x	x	----------	7-30/52
Switch and single receptacle, w. t., angle type, 2-pole, 3-wire, grounded, Cat. no. 3855 with 1-pole switch, Cat. no. 3856 with 2-pole switch, 10 a., 250 v. max., Dwg. no. M-5472, Alt. 4	x	x	x	----------	7/30/52
Switch and double receptacle, w. t., angle type, 2-pole 3-wire, grounded, Cat. no. 3858 with 1-pole switch, Cat. no. 3859 with 2-pole switch, 10 a., 250 v. max., Dwg. no. M-5473, Alt. 4	x	x	x	----------	7/30/52
Marine Electric Corp., New York, N. Y.					
Fused distribution panel, 2-circuit, 200 a., Dwg. no. 3-13-52-B, Alt. 0	x	x	----------	----------	5/5/52
Marine Electric Co., Portland, Oreg.					
Emergency disconnect switch for lifeboat winch control, w. t., 100 a., 25 h. p., 240 v. d. c. and 30 h. p., 450 v. a. c., Cat. no. 2121, Dwg. no. D-2102, Rev. C (Drain opening and plug or valve to be provided at installation)	x	x	x	----------	5/13/52
Limit switch for use with lifeboat winches, control circuit type, 2-pole, 550 v. d. c. or a. c., Cat. no. 2202, Dwg. no. D-2104, Rev. A. (Drain opening and plug or valve to be provided at installation)	x	x	x	----------	5/28/52
Marine Moisture Control Co., Long Island City, N. Y.					
Gear case dehydrator, condensing type, model 8, 440 v. 60 cy. a. c., Dwgs. nos. A-1035, Sheets 10A, 10B, and 12 Rev. 6/25/52	x	x	----------	----------	7/9/52

CONDITIONS OF TERMINATION OF APPROVALS

The termination of approvals of equipment made by this document shall be made effective upon the thirty-first day after the date of publication of this document in the Federal Register. Notwithstanding this termination of approval on any item of equipment, such equipment manufactured before the effective date of termination of approval may be used on merchant vessels so long as it is in good and serviceable condition.

Approval No. 164.007/9/1 "Banroc 202AA," mineral wool type structural insulation identical to that described in National Bureau of Standards Test Report No. TG-3619-36; FR-1404 dated May 17, 1939, blankets with asbestos paper facings approved for use without other insulating materials to meet Class A-60 requirements in a 3-inch thickness and 16 lbs. per cubic foot density, manufactured by Johns-Manville Sales Corp., 22 East Fortieth Street, New York 16, N. Y. (Supersedes Approval No. 164.007/9/0 published in the FEDERAL REGISTER dated July 31, 1947.)

(R. S. 4405, 4417a, 4426, 49 Stat. 1384, 1544, 54 Stat. 346, 1028, and sec. 5 (e), 55 Stat. 244, 245, as amended; 46 U. S. C. 367, 369, 375, 391a, 404, 463a, 1333, 50 U. S. C. App. 1275; 46 CFR Part 144)

Dated: June 5, 1952.

[SEAL] MERLIN O'NEILL,
Vice Admiral, U. S. Coast Guard, Commandant.

[F. R. Doc. 52-6547; Filed, June 13, 1952; 8:49 a. m., 17 F. R. 5398—6/14/52.]

FUSIBLE PLUGS

The regulations prescribed in Subpart 162.014, Subchapter Q, Specifications of this chapter, require that manufacturers submit samples from each heat of fusible plugs for test prior to plugs manufactured from the heat being used on vessels subject to inspection by the Coast Guard. A list of approved heats which have been tested and found acceptable during the period from July 15 to August 15, 1952, is as follows:

M. Greenberg's Sons, 765 Folsom Street, San Francisco 7, Calif., Heat No. 168.

A balancing pendant is a chain bridle or length of chain used in lifting 9 x 32 lighted buoys.

A cluster burner is a group of several acetylene burners mounted as a unit to furnish a more powerful light.

A colored sector is the arc of the horizon from which a colored light may be seen.

SAFETY IS OUR BUSINESS

TITLE 3—THE PRESIDENT

PROCLAMATION 2987

FIRE PREVENTION WEEK, 1952

BY THE PRESIDENT OF THE UNITED STATES OF AMERICA

A PROCLAMATION

Whereas destructive fires continue to take an enormous toll of life and property despite the compelling need for the conservation of our human and natural resources in order to strengthen the defense of the Nation; and

Whereas a more concerted and widespread effort to prevent such fires must be made during the coming year if the lives of approximately eleven thousand of our citizens are to be spared, and the suffering and disability of many thousands more prevented; and

Whereas, in this period of crisis, the Nation can ill afford the needless waste of nearly a billion dollars in irreplaceable materials, facilities, and resources:

Now, therefore, I, Harry S. Truman, President of the United States of America, do hereby designate the week beginning October 5, 1952, as Fire Prevention Week.

I urge that every man, woman, and child in this great country, contribute to the nation-wide effort to strengthen the United States by accepting a personal responsibility in the never-ending campaign to save life and property by preventing destructive fires. I request that State and local governments, the American National Red Cross, the National Fire Waste Council, the Chamber of Commerce of the United States, and business, labor, and farm organizations, as well as churches, schools, civic groups, and agencies of public information, cooperate fully in the observance of Fire Prevention Week. I also direct the appropriate agencies of the Federal Government to assist in this crusade against the loss of life and property resulting from fires.

In witness whereof, I have hereunto set my hand and caused the Seal of the United States of America to be affixed.

Done at the city of Washington this 18th day of August in the year of our Lord nineteen hundred and fifty-two, and of the Independence of the United States of America the one hundred and seventy-seventh.

[SEAL] HARRY S. TRUMAN.

By the President:
DAVID BRUCE,
Acting Secretary of State.

[F. R. Doc. 52-9292; Filed, Aug. 20, 1952; 11:27 a. m. 17 F. R. 7613—8/21/52.]

Merchant Marine Personnel Statistics

MERCHANT MARINE OFFICER LICENSES ISSUED

June 1952

DECK

Grade	Original	Renewal
Master:		
Ocean	28	167
Coastwise	4	12
Great Lakes		7
B. S. & L.	3	42
Rivers	7	26
Radio officer licenses issued	75	
Chief mate:		
Ocean	31	32
Coastwise	1	1
Mate:		
Great Lakes		
B. S. & L.	6	10
Rivers	2	8
Second mate:		
Ocean	29	45
Coastwise		
Third mate:		
Ocean	83	56
Coastwise		
Pilots:		
Great Lakes	6	19
B. S. & L.	81	162
Rivers	39	40
Master: Uninspected vessels	4	10
Mate: Uninspected vessels	2	1
Total	401	638
Grand total	1,039	

ENGINEER

Grade	Original	Renewal
STEAM		
Chief engineer:		
Unlimited	29	177
Limited	3	80
First assistant engineer:		
Unlimited	24	49
Limited	1	12
Second assistant engineer:		
Unlimited	25	63
Limited	3	5
Third assistant engineer:		
Unlimited	125	66
Limited		1
MOTOR		
Chief engineer:		
Unlimited	8	48
Limited	24	51
First assistant engineer:		
Unlimited	3	3
Limited	10	5
Second assistant engineer:		
Unlimited	2	12
Limited	1	
Third assistant engineer:		
Unlimited	103	79
Limited	1	
Chief engineer: Uninspected vessels	6	4
Assistant engineer: Uninspected vessels	3	1
Total	371	656
Grand total	1,027	

INVESTIGATING UNITS

Coast Guard Merchant Marine Investigating Units and Merchant Marine Details investigated a total of 644 cases during the month of June 1952. From this number, hearings before examiners resulted involving 19 officers and 59 unlicensed men. In the case of officers, 1 license was revoked, 4 were suspended without probation, 7 were suspended with probation granted, no license was voluntarily surrendered, 2 cases were dismissed after hearing, and 3 hearings were closed with an admonition. Of the unlicensed personnel 10 certificates were revoked, 13 were suspended without probation, 16 were suspended with probation granted, 2 certificates were voluntarily surrendered, 2 hearings were closed with admonitions and 4 cases were dismissed after hearing.

ORIGINAL SEAMEN'S DOCUMENTS ISSUED

June 1952

Type of document	Canal Zone	Atlantic coast	Gulf coast	Pacific coast	Great Lakes and rivers	Total
Staff officer		39	10	24	16	89
Continuous discharge book			8			8
Merchant mariner's documents	2	1,249	379	683	1,350	3,663
AB any waters unlimited		152	35	71	21	279
AB any waters, 12 months		79	34	48	91	252
AB Great Lakes, 18 months		1	4		46	51
AB tugs and towboats, any waters						
AB bays and sounds [1]		1				
AB seagoing barges						
Lifeboatman		322	41	110	91	564
Q. M. E. D		226	42	90	133	491
Radio operators		9	4	9	2	24
Certificate of service	2	1,024	363	633	1,280	3,302
Tankerman		5	16	8	33	62

[1] 12 months, vessels 500 gross tons or under, not carrying passengers.

NOTE.—The last 11 categories indicate number of endorsements made on United States merchant mariner's documents.

WAIVER OF MANNING REQUIREMENTS

June 1952

Waivers	Atlantic coast	Gulf coast	Pacific coast	Great Lakes	Total
Deck officers substituted for higher ratings			2	2	4
Engineer officers substituted for higher ratings	9		4		13
O. S. for A. B.	31	23	36	1	91
Wiper or coal passers for Q. M. E. D	8	3	37	5	53
Total waivers	48	26	79	8	161
Number of vessels	36	21	38	6	101

NOTE.—In addition, individual waivers were granted to permit the employment of 24 able seamen holding certificates for "any waters—12 months" in excess of the 25 percent authorized by statute.

CAPTAIN JOHN OETTL RETIRES

On September 1, 1952, Capt. John Oettl, Marine Inspection Officer on the staff of the Commander, Eighth Coast Guard District, retired after almost 34 years of service in the Steamboat Inspection Service, the Bureau of Marine Inspection and Navigation, and the United States Coast Guard.

Since 1942 he has been Marine Inspection Officer, Eighth Coast Guard District, Prior to that time he was supervising inspector of the old Fourth District. It is interesting to note that he was one of the last of the supervising inspectors on active duty.

Before entering the Government service he enjoyed extensive engineering experience in the Merchant Marine. Some of the companies he served with were the American T. & L. Co., the New York & Baltimore Transportation Co., and the I. E. Emerson Co.

CAPTAIN JAMES C. WENDLAND

Capt. James C. Wendland, USCG, succeeds Captain Oettl as Marine Inspection Officer. A veteran of more than 26 years Coast Guard service, Captain Wendland comes to this position from Washington where, since 1949, he has served as Executive Secretary of the Merchant Marine Council. During World War II he served as senior Merchant Marine Detail Officer in the Ceylon and India area. From 1938 until 1942 he instructed Merchant Marine Deck Officers at the United States Maritime Service Training Station, Fort Trumbull, New London, Conn.

SODIUM AND POTASSIUM DICHROMATES
SODIUM AND POTASSIUM BICHROMATES
AND CHROMATES

WARNING! HARMFUL DUST
MAY CAUSE RASH OR EXTERNAL ULCERS

Keep container closed.

Avoid contact with skin and eyes.

Avoid breathing dust or solution spray.

In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes; for eyes, get medical attention.

Wash clothing before re-use.

Use fresh clothing daily. Take hot shower after work using plenty of soap.

SODIUM

DANGER! REACTS VIOLENTLY WITH WATER
LIBERATING AND IGNITING HYDROGEN

MAY CAUSE BURNS

Keep from any possible contact with water.

Keep container tightly closed.

Do not get in eyes or on skin.

Wear goggles and DRY gloves when handling.

In case of fire, smother with DRY SODA ASH—NEVER USE WATER OR CHEMICAL FIRE EXTINGUISHERS

Dispose of SODIUM by burning carefully in an open fire.

FIRST AID TREATMENT

CALL A PHYSICIAN IMMEDIATELY.

SKIN: Remove SODIUM and flush affected area with water.

EYES: IMMEDIATELY flush eyes with plenty of water for 15 minutes. Get medical attention.

U. S. GOVERNMENT PRINTING OFFICE: 1952