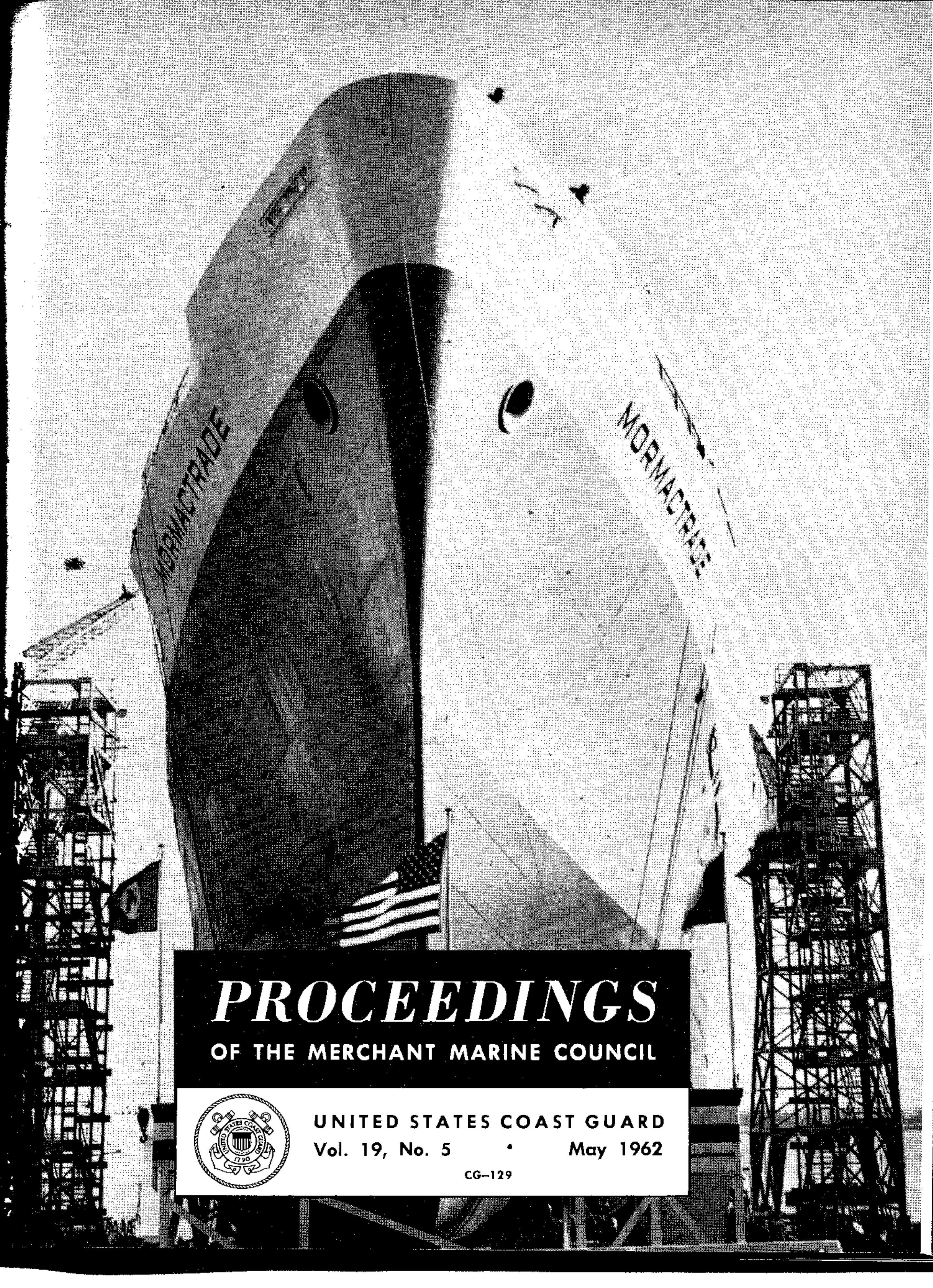

PROCEEDINGS

OF THE MERCHANT MARINE COUNCIL

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PROCEEDINGS

OF THE

MERCHANT MARINE COUNCIL

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The Merchant Marine Council of The United States Coast Guard

This Copy FOR NOT LESS THAN 20 Readers PASS IT ALONG

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Launching of the SS *Mormac Trade* at Sun Shipbuilding, Chester, Pa. *Courtesy Moore-McCormack Lines.*

BACK COVER

Diesel Ferry *Shelter Island* shown on one of its first runs on Long Island Sound. *Courtesy Shelter Island & Greenhart Ferry Co.*

The Congress of the United States by a joint resolution approved May 20, 1933 (48 Stat. 73), designated May 22 as National Maritime Day, thus honoring our Merchant Marine by commemorating the departure from Savannah, Georgia, on May 22, 1819, of the *Savannah* on the first transoceanic voyage by any steamship, and requested the President to issue a proclamation annually calling for the observance of that day.

THE TURBINE powered Sikorsky S–62 has been selected by the U.S. Coast Guard as its new Search and Rescue helicopter. The 'copter is a gas-turbine, single engine, single rotor craft with a cruising speed of 90–95 knots and a carrying capacity of 2,900 pounds.

The S–62 is able to fly approximately 190 miles, pick up an injured person either with the rescue hoist or by landing on the water, and return to its home base with ten percent fuel remaining.

The amphibious hull of the S–62, plus a new unique rescue platform, is expected to revolutionize present helicopter rescue techniques.

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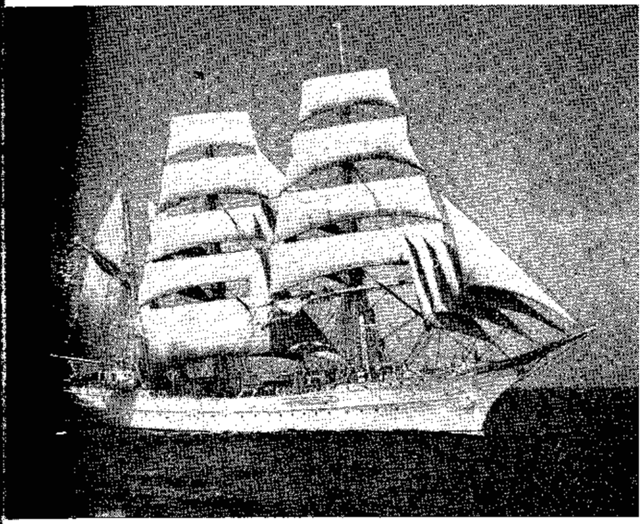
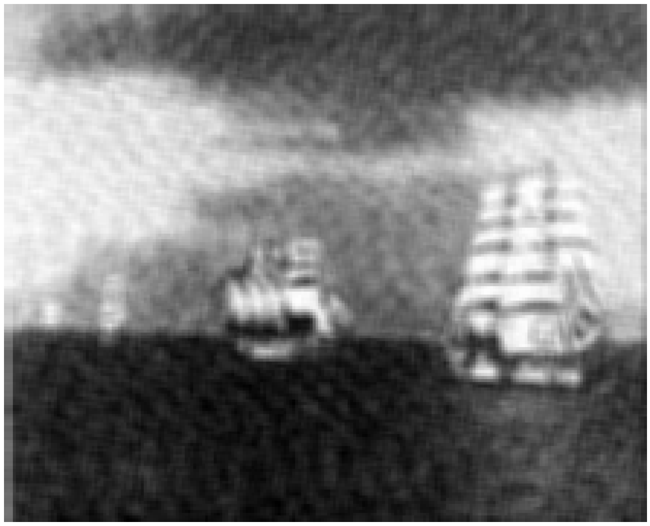
OPERATION SAIL—1964



THE USCGC "EAGLE," proposed flagship of the 1964 Operation Sail.



SAILING SHIPS of various nations shown off the coast of Portugal with the Portuguese barque Sagres in the lead.

ONCE MORE New York will become a maze of bowsprits and yardarms, billowing canvases and rigging, when, in the summer of 1964, tall ships from many countries will sail together into the harbor—the first such rendezvous in American waters in modern times.

These are the sail training ships still used in 20 countries to school young men in the arts and traditions of seamanship. Some square rigged, others fore and aft, they're the last of the "tall ships."

They'll come across the Atlantic from Europe, they'll come from South America, and some will even come from the Far East, perhaps rounding the Horn on their way. It is anticipated that the ships will all meet in Bermuda, then sail together to New York, perhaps racing on their way.

The event will be called "Operation Sail—1964," and invitations are now being prepared for transmittal later this month by the State Department to all of the countries, including Russia. Others being invited to participate are Argentina, Belgium, Brazil, Chile, Denmark, France, West Germany, England, Greece, Indonesia, Italy, Japan, Norway, Poland, Portugal, Spain, Sweden, and Turkey. America's own square rigger the USCGC *Eagle*, is expected to become the flagship of the sailing fleet.

After arrival in New York the ships will form a line on the North River for a formal review with ceremonies. Then will follow an inshore regatta of longboat races and other exercises and contests. Plans call for a colorful parade from the Battery to City Hall of all the visiting cadets in their national uniforms. They'll probably number more than a thousand. A day at the World's Fair in Flushing should prove a highlight of their visit in New York.

Endorsed during the late 1950's by President Eisenhower as part of his "People-to-People" program, Operation Sail is organized jointly by a special committee of shipping people in New York and by the Sail Training Association in London. Prince Philip is patron of the association. Every second year since 1956 the association has conducted a tall-ship race in European waters. In 1960 they raced between Oslo and Ostend. In Operation Sail in 1964, for the first time, the ships are to cross the Atlantic together.

The New York committee contains almost every facet of American and local shipping industry—the U.S. Coast Guard, the U.S. Maritime Administration, the U.S. Merchant Marine Academy, the New York State Maritime College, the New York City Department of Marine and Aviation, the Port of New York Authority, the Schoolship *John W. Brown*, the New York Shipping Association, the Trans-Atlantic Passenger Steamship Conference, the American Merchant Marine Institute, and the New York Towboat Exchange. Members of the committee have already met with the Sail Training Association people in London, and have visited in Lisbon and Bermuda. Although official invitations have not yet gone out, word has already been received that participation in Operation Sail will be on a worldwide basis.

SHIP PROPELLERS

High tensile brass was the standard material for ship propellers up to 1946. During World War II the British Admiralty was faced with a series of propeller failures on high-speed motor-torpedo boats. It was found that the blades of high-tensile brass were cracking and fracturing in the root section due to corrosion fatigue, the cracks occurring at the leading face where the blade is under tension. Nickel producers and marine propeller manufacturers suggested that nickel-aluminum-bronze would remedy the situation because of its light weight, high strength, and corrosion and cavitation resistance. Trials were completely successful and the British Admiralty standardized on this alloy for motor-torpedo boats with the result that failures were eliminated. Since then a nickel-aluminum-bronze alloy for large oceangoing vessels has been developed with the essential corrosion-resistant properties and mechanical properties. Nickel-aluminum-bronze propellers now in use range in size up to a 39-ton, five-bladed screw for a French supertanker. *Courtesy Marine Journal.*

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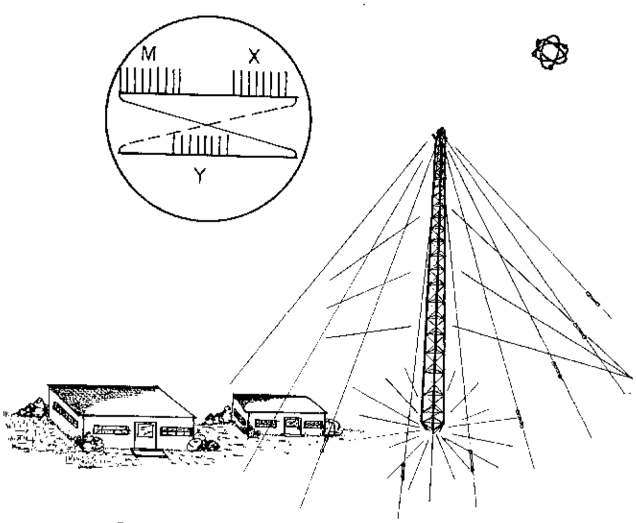
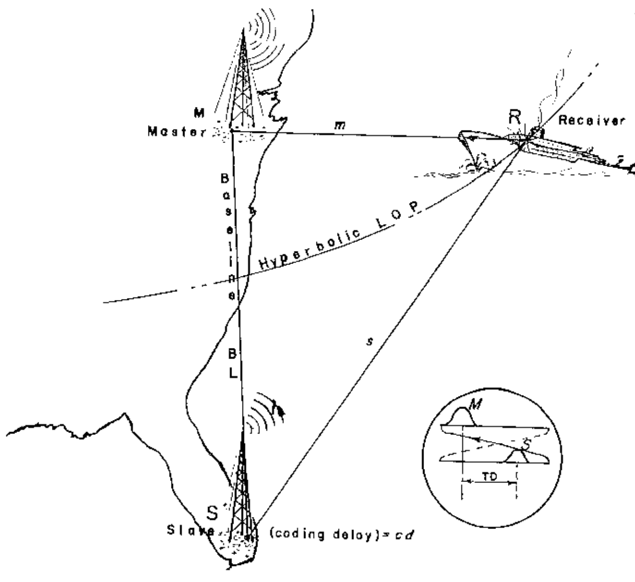
LORAN-C



Signals on an Oscilloscope

Showing Time Sharing of Pulse Repetition Interval

Figure 1.



The Loran Time Difference

The Loran Time Difference = BL + cd + s − m

Figure 2.

PRECISION TIME LORAN

(A Discussion of Loran-C Receivers)

By CDR Elmer M. Lipsey, USCG

INTRODUCTION

WHEN THE 15th-CENTURY traveler first ventured beyond the shorelines of Europe, his tools for locating himself were limited to the quadrant, the magnetic compass, the hour glass, and the speed log. With the quadrant, he was able to determine latitude by observing the transit of celestial bodies across the meridian of his position. With the compass, hour glass, and log, he was able to reckon course and distance traveled from his point of origin. While latitude could be calculated accurately enough for his purposes, it was apparent that the determination of longitude left much to be desired. Because the trails of discovery and fortune lay in the Western hemisphere, the early navigator evolved and practiced numerous methods involving astronomical observations for determining longitude.

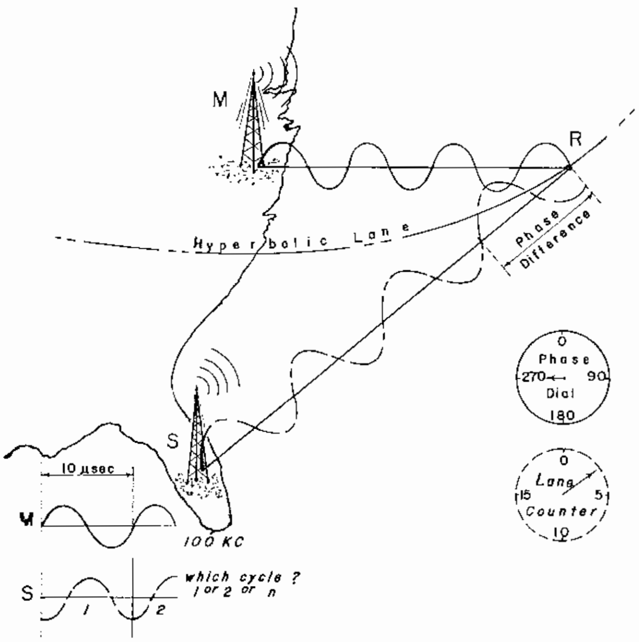
However, between the 15th and 18th centuries, the problem of determining longitude was one of ascertaining accurately time of the prime meridian. It was not until the 18th century that the forerunner of the present-day shipboard chronometer was invented. With it came the ability to determine longitude to within 1 degree. Finally, with the advent of the radio came the transmission of electronic time signals by which the integrity of the chronometer is preserved. Today, a 1-second measurement error in absolute time represents longitude errors of about 0.4 minutes—provided time is the only error.

In spite of his ability to measure time, the 20th-century navigator has been plagued with the requirement for lengthy, time-consuming calculations when determining position by astronomical means. In recent years efforts have been directed toward the reduction of time needed to determine geographic position, and numerous radio techniques have been derived.

Because radio energy takes only about 6 microseconds (millionths of a second) to travel one nautical mile, the determination of absolute travel-time of radio signals to microsecond (μ sec) accuracy is required for precision navigation. This time measurement is even a more difficult physical problem than that faced by the early navigator. To overcome the difficulties of measuring absolute time, navigation systems have been devised which utilize *the difference* in time of receipt of two radio signals.

HYPERBOLIC SYSTEMS

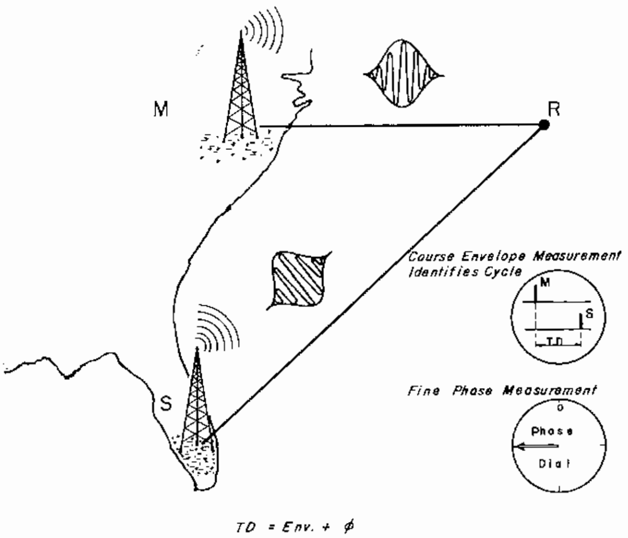
Time intervals can be measured very accurately. For instance, a single cycle of radio energy at 100 kilocycles (kc) represents 10 microseconds of time interval. Thus, frequency and time intervals are interchangeable. The frequency of a 100-kc oscillator can be divided or multiplied electronically to give any reasonable finite time interval. The accuracy of the measurement is dependent upon the accuracy of the oscillator. If synchronized radio signals are transmitted from two separate sources, it is possible to measure precisely the difference in time of receipt of these signals at a receiver. Since radio energy propagates at a constant velocity, the difference in time of receipt of the two signals represents the difference in distance of the transmission paths from the two transmitters to the receiver. The locus of points representing a constant difference in distance from two fixed points is hyperbola. Consequently, accurate time measurement dictates that a hyperbolic system be used for long-range electronic navigation. Numerous systems are in use today employing both continuous



A C.W. Hyperbolic System

Showing Lane Ambiguity

Figure 3.



The Loran-C Time Difference

Figure 4.

radio signals and intermittent or pulsed signals. That which is in most widespread use is of the latter type and is the well-known loran system. Because of the need for more accurate, automatic navigation over long distances, an improved loran called Loran-C has become available to the navigator.

ABOUT THE AUTHOR

CDR E. M. LIPSEY is a graduate of the U.S. Coast Guard Academy class of 1945. His shipboard service includes tours of duty on board a patrol frigate and a transport in the South Pacific during World War II. After the war he served on several buoy tenders while on a tour of duty in Alaska. He completed naval flight training in 1951 and was designated a Coast Guard aviator. His service in Coast Guard aviation took him to New York and the Philippine Islands. His duties have included supervisory capacity over internal and external communications and equipment of floating, shore, and aviation units in addition to flying. In 1958 he was awarded the Air Force Commendation Medal from the U.S. Air Force Institute of Technology at Wright Air Development Center. For his work in the field of radar reflectors, he was awarded an M.S. in electrical engineering. CDR Lipsey is a member of the Institute of Radio Engineers, Institute of Aeronautical Sciences, and a registered professional engineer in the State of Ohio. He has published numerous papers on radar reflectors and Loran-C. He is presently assigned to the Development Branch of the Electronics Engineering Division, at Coast Guard headquarters.

Because the new system holds promise as *the* future long-range aid to navigation, an effort is made here to describe, in layman's terms, the principles of operation.

CHARACTERISTICS OF THE LORAN-C SYSTEM

Transmissions in the Loran-C system are characterized by groups of pulses from stations known as master and slaves. Pulse transmissions from slave stations are precisely synchronized in time to those from the master station. Master station transmissions are identified by a nine-pulse transmission, whereas the slave stations transmit only eight. For efficient use of the available frequency spectrum, the master and slave transmissions occur on the same frequency of 100 kilocycles. The interval between times of repeated transmissions from the master station is called the pulse repetition interval. The pulse repetition interval (PRI) is "time shared" with each of the slave stations. That is, the master station transmits and is followed in succession by each of the slaves. The interval between the time of transmission of the master and each succeeding slave is a system constant, and is composed of the time for the electromagnetic energy to travel from the master to slave plus a delay time at the slave called coding delay. The coding delay eliminates ambiguous time differences.

If Loran signals were presented on an oscilloscope whose time trace represents the pulse repetition interval in microseconds, an observer would see the picture shown in *Figure 1.* In order to measure the time difference of receipt of the master and each succeeding slave signal, he would merely be required to measure the distance along the trace between the beginning of the master pulse and the beginning of each slave pulse.

THE LORAN TIME DIFFERENCE

To better understand the definition "Loran Time Difference," the reader is referred to *Figure 2*. *Figure 2* is a display of the typical Loran pair in which the master station transmits followed at a precise interval by the slave. The series of events which takes place is as follows:

The master station transmits a pulsed signal which radiates in all directions. The signal proceeds along the baseline (the line joining the master and slave station) until it is received by the slave station. At the same time, the signal proceeds along the distance m to the receiver where it is displayed on an oscilloscope. The slave station receives the master's signal, waits a specified time known as the coding delay, and then transmits its pulsed signal. The slave signal then is transmitted along the distance s to the receiver and appears as a second signal on the oscilloscope. If the oscilloscope trace is broken in half so that there appears to be two traces on the scope one above the other, then the slave signal can always be made to appear on the lower trace and to the right of the master signal by appropriate selection of the coding delay. For example, if the scope trace represents 100,000 microseconds, the upper trace represents the time 0 to 50,000 microseconds, while the lower trace represents the time interval 50,000 to 100,000 microseconds. If the coding delay were selected to exceed 50,000 microseconds, then whenever the signals were placed on the scope so that the signal on the lower trace was to the right of the signal on the upper trace, one would be able to identify the fact that the signal on the top trace was the master signal and that on the lower trace the slave. In order to measure the time difference between the receipt of the master and slave signal at the receiver, it only would be necessary to measure the time along the single trace from the position directly under the master signal to that directly under the slave signal and add to it the 50,000 microseconds (½ PRI) to obtain the time difference reading. Referring back to the diagram, the reader can determine that the Loran time difference can be represented by the equation:

$$T_d = BL + CD + s - m$$

Where:

BL=Time for transmission of the master signal along the baseline.

CD=Coding delay inserted by the slave.

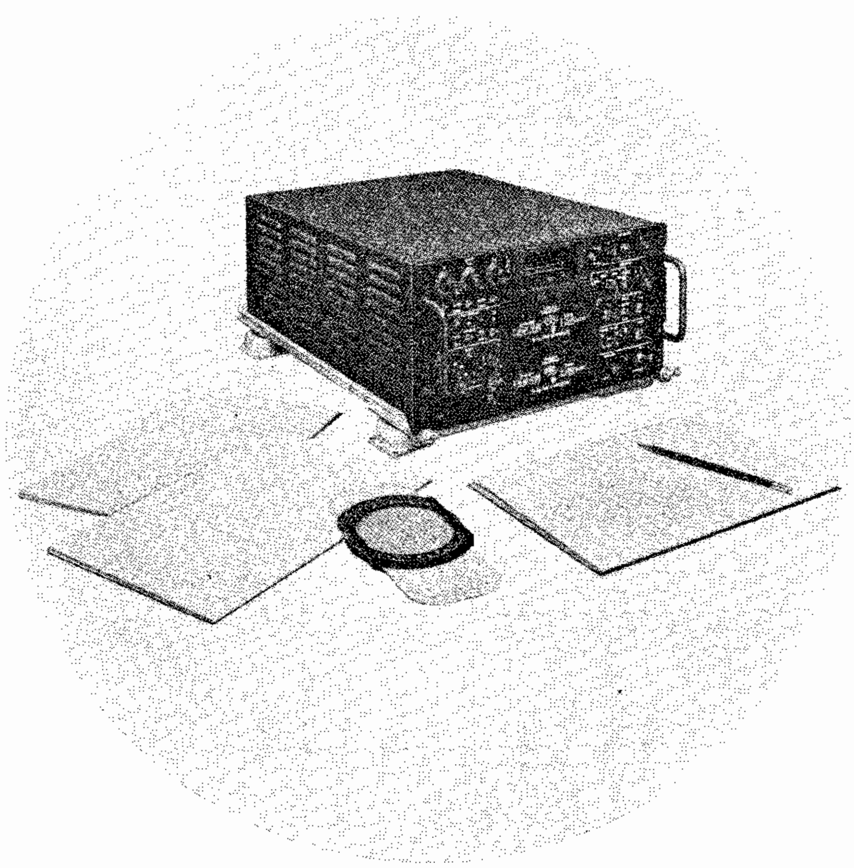
s=Time for transmission of the slave signal along the distance s.

m=Time for transmission of the master signal along the distance m.

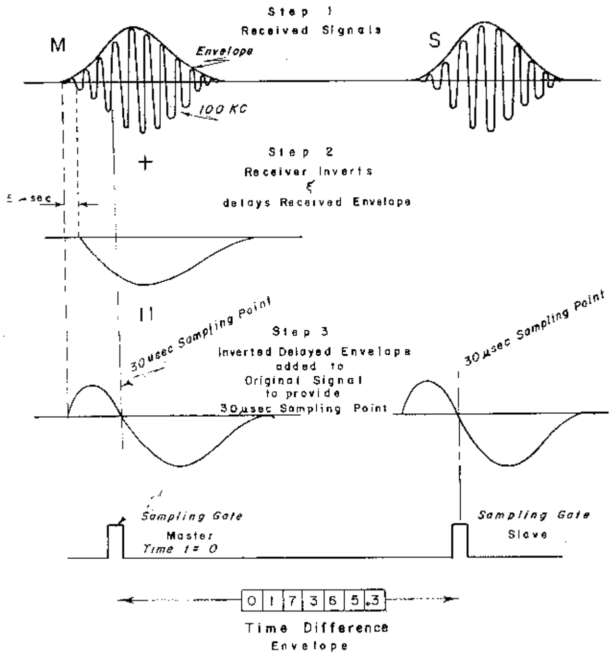
THE CW HYPERBOLIC SYSTEM

In order to explain how precision is obtained from the Loran-C system, it is necessary to consider a continuous wave hyperbolic navigation system. *Figure 3* depicts a CW system in which a master station and a slave station are sending out synchronized, continuous (CW) radio signals. The term "synchronization" means that as the radiofrequency signal starts in the positive direction at the master, it also starts in the positive direction at the slave. For the moment, let us stop the CW signal in time and space and observe what happens in such a system. The signal from the master station is received at the receiver at some time corresponding to the transmission time for 3½ cycles of the CW signal. However, the slave signal is received at a time corresponding to 3¾ cycles of the CW signal. Since the signals started out precisely synchronized, the difference in the number of cycles or "phase" between the two signals is a function of the position of receiver. It is apparent that as the receiver is moved from its original position, the phase difference between the two signals will change. At some point the phase difference will be "0," then a maximum, then a minimum, then "0" again. Because of the repetitive nature of the phase difference, it can be seen that the receiver is located in a "lane." Since the transmission times of this system are analogous to that of the Loran system previously described, the lane is hyperbolic. To obtain the correct lane, it is only necessary to count the number of lanes which the receiver has passed through from some known position in order to determine the present position of the receiver. Because phase difference may be measured very accurately, the phase difference measurement made by the receiver is an extremely precise measurement of the position of the receiver within the hyperbolic lane. For instance, if the frequency considered is 100 kc, then one complete cycle can be represented by 10 microseconds of time. It is possible to measure phase difference to 1 degree or 0.03 microsecond. An accuracy of 0.03 microsecond on the line between the master and slave station is approximately 17 feet.

Unfortunately, certain physical factors detract from such a system. These arise from the fact that energy is transmitted in all directions. In addition to being transmitted along the surface of the earth, the energy is transmitted upward and strikes the ionosphere from which it is reflected back to earth. This energy arrives at the receiver and cannot be distinguished from the "ground wave" signal (the signal propagated along the surface of the earth between transmitter and receiver). As a result, the receiver proceeds into the region in which the "sky wave" signal also is received, the CW signal is distorted and the accuracy of the system is destroyed. If the receiver is moved beyond the range at which the ground wave signal can be received, then the

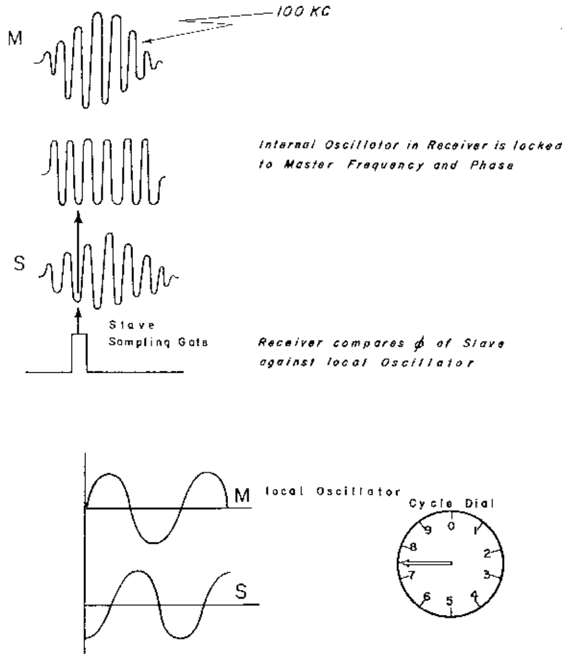


SHOWN HERE is a lightweight, automatic, LORAN-C receiver manufactured by ITT Federal laboratories.



The Automatic Envelope Measurement

Figure 5.



The Automatic Phase Measurement

Figure 6.

measurement can be made solely on the skywave signal. Unfortunately, at low frequencies such as 100 kc there are multiple reflections from the various ionized layers of the ionosphere; and the multiple skywaves can destroy such a system. Consequently, in order to use a CW system for long-range navigation, it is necessary to either (*a*) make the phase measurement prior to the arrival of the skywave signals, or (*b*) reduce the transmitted radiofrequency to very low frequencies where only a single, stable skywave signal exists.

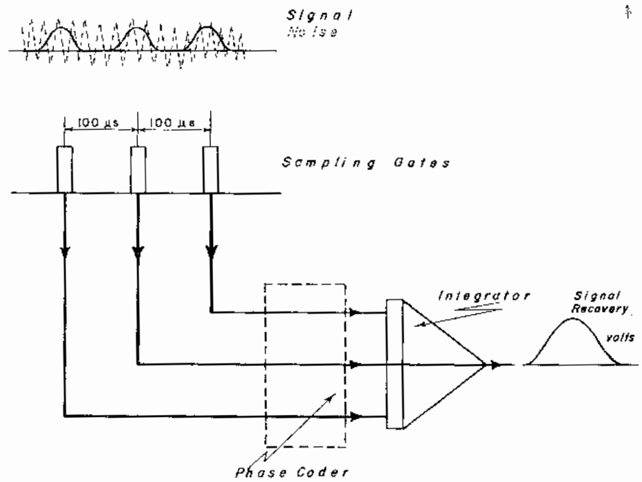
THE LORAN-C TIME DIFFERENCE

Now let us examine the Loran-C system and see how it encompasses the attributes of the cycle-measuring techniques of the CW system and the envelope-measuring techniques of the Loran system to obtain precise accuracy over long ranges. In the Loran-C system of navigation a pulse of energy is transmitted from a master station and from a slave station as in basic Loran. The envelope signal, similarly, is synchronized in time so that at a precise time after the transmission of the master signal, the slave station transmits. In addition, as in the CW system, the RF energy composing the signal also is synchronized precisely so that when the master signal starts in the positive direction, the slave signal starts in the positive direction. At the receiver, the difference in time of receipt of the master and slave envelope signals is measured to obtain a coarse hyperbolic line of position. At the same time the phase measurement between the two signals is made which yields an extremely fine vernier of the geographic line of position. Thus, the time difference reading in the Loran-C system consists of a coarse envelope measurement and a fine phase measurement, as shown in *Figure 4.* Since one cycle of the Loran-C signal represents 10 to μs, it is necessary to make the coarse measurement to within ±5 μs in order to eliminate 10 μs ambiguities in the measurement.

But wait, does not the Loran-C signal propagate in all directions? And does not the Loran-C signal strike the ionosphere and bounce back and be received by the receiver? And does not this composite signal distort the phase as in the CW signal? The answers to these questions can be found in the concluding sentence of the preceding section. It was stated that an accurate system could be obtained, provided the signal was measured *prior* to the receipt of the skywave signal. It takes a certain period of time for the Loran-C signals to propagate over the surface of the earth directly from the transmitters to the receiver. Since pulses of energy are used, the skywave signal appears at the receiver at some later time than the groundwave signal because of the longer propagation path. Long-term observation of the 100-kc signal indicates that this timelag is approximately 30 microseconds. Consequently, it is only necessary to make the measurement of the envelope and cycle of the Loran-C signal within the first 30 microseconds after the receipt of the groundwave to avoid "skywave contamination." In the Loran-C receiver this measurement is made automatically. It is interesting to examine how such an automatic measurement can be made.

THE COARSE MEASUREMENT

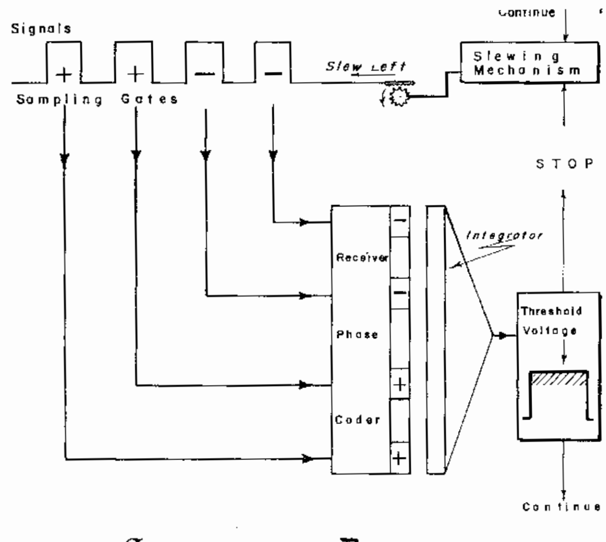
Figure 5 depicts the steps performed by the receiver to automatically determine the 30-microsecond sampling point and obtain the envelope time difference. Both the envelopes and the rf cycles are shown. First, the master signal is received at the receiver. Second, the receiver takes the master signal envelope, retards it in time by 5 microseconds, inverts it, and then adds the inverted, delayed signal to the envelope of the original signal. The composite signal resulting appears in the third line of *Figure 5.* By appropriately adjusting the amplitude of the inverted, delayed signal, the resultant waveform can be made to cross the axis at a point in time 30 microseconds after the beginning of the master signal. This 30-micro-



Signal Integration

Permits Signal to be SEEN even when Noise is so great that Signal cannot be seen on Scope

Figure 7.



Synchronous Detection

Phase Coding permits Automatic Search for Signal, Identification & Rejection of Skywave Interference from Consecutive Pulses

Figure 8.

second sampling point, as it is called, is utilized to position a "sampling gate" in the receiver. The sampling gate is nothing more than an electronic switch which turns on the remainder of the receiver to sample the voltage of the incoming signal. The sampling gate is so positioned by a servomechanism that when the receiver sampling of the composite waveform gives a positive voltage (i.e., to the left of the zero cross over), the sampling gate is translated to the right in time (retarded). Conversely, when the sampled voltage is negative, the sampling gate is moved to the left on the time base. The slave signals are received in precisely the same fashion and a sampling gate is positioned on the slave signal. Consequently, the time difference between the two sampling gates measured in an electronic variable delay line is precisely the coarse envelope measurement of the Loran-C signal. It is easy to conceive how the differential between the shaft rotations of the servomotors positioning the master sampling gate and the slave sampling gate can be utilized to drive a counter which gives the coarse envelope time difference.

THE FINE MEASUREMENT

Now let us see how the automatic phase measurement can be made. *Figure 6* shows the incoming master rf signal without the envelope sketched in. In order to make the comparison of phase of signals which do not occur at the receiver at the same absolute time (first the master, then the slave signal is received), it is necessary to compare the signals to a reference. Inside the receiver there is a very stable oscillator. Electronically, the receiver "locks" the frequency of this local oscillator to the frequency and phase of the incoming master signal. Consequently, the phase of the local oscillator is precisely that of the master signal, and it is only necessary to compare the phase of the slave signal to that of the oscillator in order to make the phase measurement. This is accomplished by utilizing the envelope sampling gate for the slave signal. The slave sampling gate allows the receiver to be turned on and to "look" at the slave signal at the 30-microsecond sampling point. The comparison of the phase of the slave signal against the phase of the local oscillator is presented on a "cycle counter" dial. Because the measurement is made in units of time, the dial is calibrated from 0 to 10 microseconds. The total time difference is the sum of the envelope reading and the phase reading. If the coarse measurement (envelope) were 19374.2μ and the fine (phase) 1.36μ, the actual time difference would be 19371.36μ.

SOME FEATURES OF THE LORAN-C SYSTEM

Multipulsing

Why is it necessary to utilize a series of pulses in the Loran-C system instead of the single pulse common to basic Loran? The transmission of low frequency signals along the surface of the earth over long distances requires tremendous power, and power is expensive. In order to reduce the peak powers necessary for long-distance transmission, an ingenious technique is employed in the Loran-C system whereby a series of pulses are generated from each station. These pulses are spaced at 1,000-microsecond intervals. Inside the receiver the pulses are "added together" or integrated. Thus, by sending out a series of pulses, much lower transmitted powers can be generated by the transmitting stations.

Signal Integration

In addition to this benefit, multipulsing allows the signals to be "seen" by the receiver even though they would not be visible on an oscilloscope to an observer. The technique employed is the same as that utilized for bouncing radar signals off the moon. *Figure 7* demonstrates this principle, known as signal integration. *Figure 7* shows a series of Loran-C signals buried in atmospheric noise on an oscilloscope. Directly below the signals are shown a series of sampling gates in the receiver spaced precisely 1,000 microseconds apart. Mathematical statistics has demonstrated that the integration of random noise (the summing of voltages produced by atmospheric noise signals over a period of time) will yield a zero value. Thus, the sampling of the noise at 1,000 microseconds' intervals over a period of time will integrate to zero. However, if there is a "nonrandom," Loran-C signal contained in this noise, it will integrate to some value other than zero and may be recovered by the receiver.

Phase Coding, Synchronous Detection, and Automatic Research

Immediately some problems arise in our system. For instance, how can we automatically search for a signal that we cannot see? How do we know where to position the sampling gates? What happens when the sky wave from preceding pulses falls on the ground wave of succeeding pulses? In order to permit the receiver to discriminate between the ground wave of one pulse and the sky wave of a preceding pulse, and in order to permit automatic searching for the signal, another technique is employed known as synchronous detection or "phase coding." Referring back to *Figure 6* this means only that as the phase of each signal starts in the positive direction, we will say that the signal is phase coded in a positive fashion. Or, if the pulse is transmitted so that the phase at the beginning of the signal starts in a negative direction, we will say that it has a negative phase coding. The transmitted signals are phase coded in a preselected fashion. This same phase coding is known in the receiver. Now let us see how this can be employed automatically to search out the signal.

Figure 8 shows a series of Loran-C pulses with appropriate phase coding. Directly underneath each signal are the sampling gates in the receiver which are connected to an integrator through the receiver phase coding mechanism. The combined device, shown as the receiver phase coder and integrator, will yield an output signal only when the sampling gate samples a Loran-C signal *of the same phase coding as contained in the phase coder* (i.e., coherent). That is, if the signal sampled by the sampling gate feeding through the phase coder is coded positively, the phase coder must be coded positive (synchronous) in order to yield an output of the integrator. Assume for the moment that the sampling gates are not positioned directly underneath the pulses, but are positioned so that the left-hand sampling gate is on the right-hand pulse. Let us assume further that a slewing mechanism exists in the receiver which permits the sampling gates to be slewed underneath the pulses from right to left. Let us assume also that the slewing mechanism is connected to the output of our phase coder-integrator such that when a specified voltage from the integrator, known as the threshold voltage, is reached, the slewing mechanism will be disengaged and the sampling gates will stop. Now let us examine what happens. The first sampling gate falls beneath the right-hand pulse. The sampling gate phase code is positive while the signal phase code is negative, and there is no output from our integrator. The slewing mechanism continues to slew the sampling gates to the left beneath the pulses. The second situation occurs when the left-hand two sampling gates are under the right-hand pulses. In this case neither has the correct phase code and there is no output from our integrator. The slewing mechanism continues to slew the sampling gates to the left under the pulses. The next event that takes place would consist of three sampling gates appearing under the three pulses on the right. Now the first sampling gate is phase coded positive. The pulse under which it appears also is phase coded positive; thus there will be a voltage generated in the integrator. The second sampling gate is phase coded positive but coincides with a negative phase coded signal; therefore no output is generated in the integrator. The third sampling gate is phase coded negative and will coincide with a negative phase coding of the last pulse. The voltage generated in the integrator from this sampling gate will be added to that of the first sampling gate. However, the sum of these voltages does not reach the necessary threshold voltage which would stop the slewing mechanism. Consequently, the sampling gates continue to slew to the left. The final situation is one in which all of the sampling gates are positioned correctly beneath the pulses in which case a maximum voltage is generated in the integrator. This maximum voltage is the threshold voltage and causes the slewing mechanism to stop. Thus the sampling gates are positioned under the appropriate pulses. Thereafter, the servomechanism technique for determining the 30-microsecond sampling points, as described in the coarse measurement, keeps the sampling gates correctly positioned at the sampling points.

Skywave Discrimination

To discriminate between the skywave and ground wave signals (which are identically phase coded), it is only necessary to provide an additional sampling mechanism 30 microseconds ahead of the sampling gates indicated. If a coherent signal from a ground wave (same phase-coded signal) is generated at these points, the slewing mechanism can again be activated to drive the sampling gates down to the ground wave signal. Consequently, our phase-coding technique permits us to automatically search for the signal and allows us further to discriminate between ground wave and skywave modes in the receiver.

CONCLUSION

Is the Loran-C system accurate? Low-frequency hyperbolic systems have long been recognized as among the most accurate. The Loran-C system is capable of giving unambiguous, ¼-mile fix accuracy at distances greater than 1,000 miles from the transmitting sites and accuracies of the order of feet as the stations are approached.

Is the Loran system economically reliable? Loran is not new. The Coast Guard has operated chains of Loran stations in all parts of the world since 1942 and has established an envious reliability record of being "on the air" over 99 percent of the time. Loran is a proved system.

Is the Loran-C system compatible with the present basic Loran system? Yes. The Loran-C pulse repetition rates have been selected so that Loran-C signals may be observed on a basic Loran receiver. However, in order to utilize a Loran-C signal on a Loran-A receiver, it is necessary to convert the 100-kc signal to that of the Loran-A frequency being used. This can be done very simply. Such a "converter" can make available Loran-C signals to provide the same degree of accuracy for navigational purposes that Loran-A signals provide. However, the full advantage of the Loran-C system lies in the long-range capability (i.e., the area in which signal cannot be seen from the noise), and consequently an automatic receiver is a necessity to seek out the long-range signal.

What can a Loran-C receiver do for the ship owner? First of all, it can provide a vessel with continuous, precise navigational information and thus reduce sailing time between ports by keeping the vessel directly and safely on its charted course. Second, it can release the second mate, who is primarily concerned with navigational problems, to perform other functions on board the vessel. For the fishing trawler the Loran-C receiver with its inherent accuracy would permit a precise return to the fishing grounds, nets, and buoyed lines, thereby saving time and money. Programed over a period of time, the savings which would accrue would certainly pay for the receiver. Thus Loran-C is a powerful tool and fulfills the needs of a modern, economy-minded, and safety-conscious maritime industry.

MARITIME SIDELIGHTS

The U.S. Public Health Service has awarded a special citation to the tanker fleet of Humble Oil & Refining Co. for excellence in ship sanitation and cleanliness in 1961.

The award, earned by Humble's fleet for the fifth straight year, covers 23 ocean tankers and the motor vessels, tugs and towboats in the company's inland-waterways operations.

⚓ ⚓ ⚓

Bids have been requested by the Maritime Administration, U.S. Department of Commerce, for one or two class I oceanographic survey ships designed by the Maritime Administration in accordance with basic concepts and requirements developed by the Coast and Geodetic Survey.

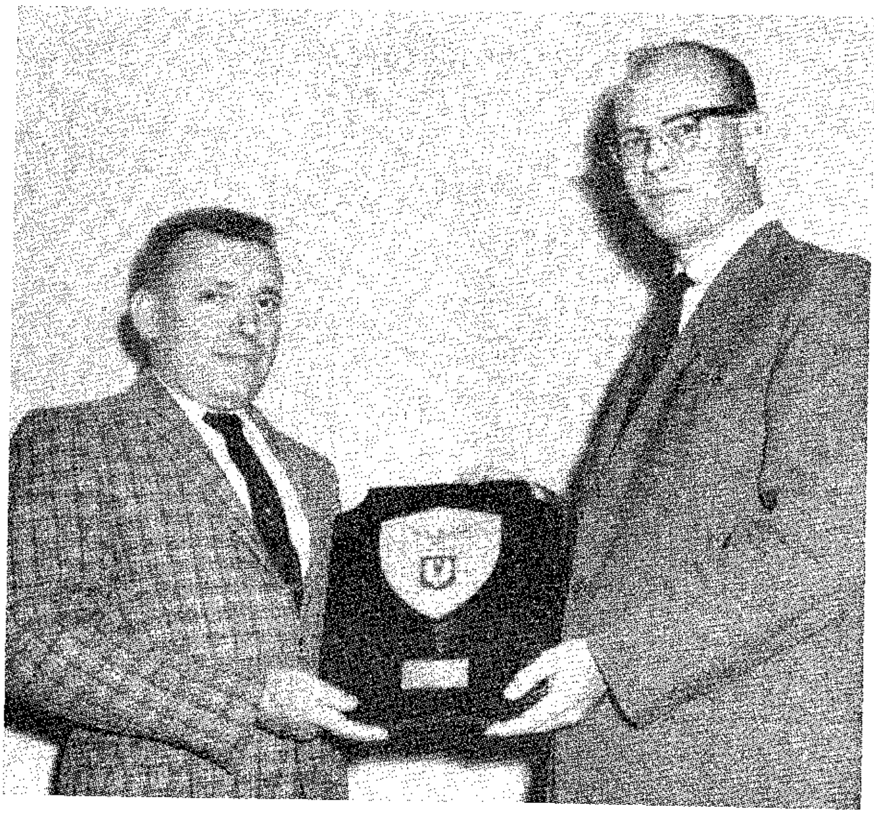
The ships will have accommodations for 116 crewmen and scientists. They will be strengthened for navigation in ice and will have extensive specialized electronic and mechanical equipment for performing oceanographic, meteorological, and geophysical observations.

⚓ ⚓ ⚓

The "Adopt-a-Ship" plan, sponsored by the Propeller Club of the United States, now has more than 10,000 young participants. Under this program schoolchildren correspond through their teachers with the masters of over 300 U.S. merchant vessels. Reportedly, the Propeller Club has a large number of requests from students who desire to "adopt" a ship, but are unable to do so due to the unavailability of participating vessels.

⚓ ⚓ ⚓

Recent development of a portable breakwater has been attributed to the U.S. Rubber Co. The device, designed to create artificial harbors and small boat marinas, and to check beach erosion, consists of float panels of plastic foam from which perforated curtains of vinyl-coated nylon are suspended. Estimated cost is about one-fourth that of the lightest type of rock breakwater. The device has not yet been tested extensively on exposed ocean beaches.



CAPTAIN ALAN BAGGS, left, master of the Lykes Cargoliner *Brinton Lykes*, which figured prominently in the recent rescue of four airmen of the U.S. Air Force after their plane plunged into the Atlantic Ocean, receives from Joseph T. Lykes, Jr., senior vice president of Lykes Bros. Steamship Co., Inc., a mounted shield of the insignia of the Ninth Air Force and an engraved silver plate expressing the appreciation of the U.S. Air Force for the role of the Lykes vessel in the rescue operation. The U.S. Coast Guard Air Detachment at Bermuda was also most complimentary of the prompt and effective action by Captain Baggs and his crew.

Two C-4 cargoships, the ex-*Marine Panther* and *Marine Fox*, renamed, respectively, *Alecia* and *Dorothy*, acquired from the Reserve Fleet by Bull Lines, New York, in trade for the two Libertys *Angelina* and *Carolyn*, are being converted at Todd Shipyards Corp.'s Seattle Division into partial containerships by installation of a traveling crane aft to handle containers in and out of the two after hatches.

The port of Baltimore's oversea traffic dropped more than 5 million tons during 1961 as compared with 1960. A decrease of approximately 4,300,000 tons of steelmaking ores accounted for most of the loss. Iron, chrome, and manganese ores made up 14,068,247 tons of imports in 1960, as compared with only 9,730,000 tons last year. Total foreign trade for the year—19,610,000 short tons—shows a decline of 21.8 percent from 1960.

nautical queries

DECK

Q. Demurrage is:

(a) Detention of a vessel beyond the lay days allowed in the charter.

(b) Refusal of a crew to perform their duty in a domestic port.

(c) Straying from an assigned and normal trade-route without justifiable cause.

(d) Theft of ship's stores.

(e) A breach of confidence by the radio operator.

A. (a) Detention of a vessel beyond the lay days allowed in the charter.

Q. (a) How would you distinguish between a list due to unsymmetrical distribution of weight and a list due to negative metacentric height?

(b) What is the effect when there is both unsymmetrical distribution of weight and a negative metacentric height?

A. (a) When a vessel has a list due to unsymmetrical weight distribution, she lists to one side and has an average rolling period. Checking the weight distribution should reveal an excess of weight on one side and a positive GM.

(b) When a vessel has a list due to negative metacentric height, she will not remain upright, but will list to either side and has a very long slow rolling period. Checking the weight distribution should reveal a negative GM.

A combination of the two causes of list causes a permanent list in conjunction with a long slow rolling period.

Q. Messages concerning tropical storms transmitted by radiotelephony are preceded by:

(a) Mayday
(b) Safety
(c) Securite (Saycuritay)
(d) SOS
(e) Now hear this

A. (c) Securite (Saycuritay)

Q. An extensive body of air within which the conditions of temperature and moisture in a horizontal plane are essentially uniform is called:

(a) The atmosphere
(b) A calm
(c) An air mass
(d) A front
(e) An occlusion

A. (c) An air mass

ENGINE

Q. What steps should be taken by the operating engineer to economically insure the desired vacuum at all times?

A. In order to have the steam do its designed amount of work the vacuum must be kept at the designed maximum efficiency figure. This figure is given in the manufacturer's printed instructions booklet.

So that the vacuum may not be impaired and yet maintained economically, the following procedure shall be had:

1. (a) Keep gland packing in good condition. (b) Keep feather of steam coming from steam packed glands at all time. (c) Keep air pumps and ejectors in excellent condition. (d) Prevent air leaks in condenser, exhaust trunks, lines to air pumps, etc. (e) Keep the temperature of the condensate several degrees below the vacuum temperature. (f) Keep the temperature of the overboard discharge 5°–8° below the vacuum temperature.

2. To insure tightness, joints of all lines under vacuum of main condenser shall be painted with shellac or asphaltum paint at least once a quarter; the painting shall be done while there is a vacuum of at least 20 inches of mercury on the condenser.

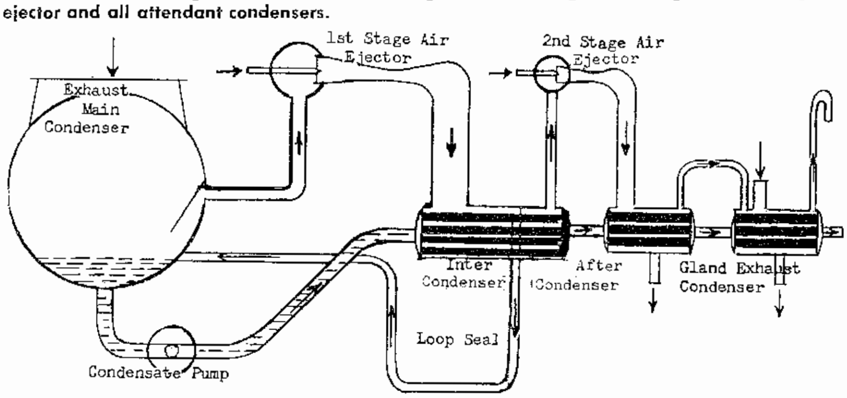
Q. Discuss the effect of operating a steam turbine under conditions other than those prescribed by the manufacturer and based on the design. (Reference to steam pressure, vacuum and superheat.)

A. Any change in the steam conditions will increase the losses in the turbine. If the steam pressure at the throttle is increased and the amount of the superheat and vacuum are unchanged, or if the vacuum is increased and the amounts of superheat and pressures are unchanged, the pressure range of the turbine, or the pressure drop through it, is increased. Consequently the pressure drop in each stage is increased, causing the steam to strike the blades with a greater velocity than that for which they were designed. Any change in velocity causes the steam to strike the blades at an angle instead of tangentially, and increase the amount of moisture in the steam near the exhaust. Increasing the vacuum has the disadvantage of increasing the volume of the exhaust steam. This means that the velocity of the steam in the passages near the exhaust end of the turbine must be increased, and produces a loss due to exit velocity and to the increased friction.

An increase in the amount of superheat, with the amount of the vacuum and pressure unchanged, increases the volume of the steam that must pass through the turbine per unit of time. The only manner in which this greater volume of steam can be forced through the passages is by increased velocity. A greater velocity means larger friction and impact losses. The capacity of the turbine may even be reduced if the amount of superheat is increased too much.

AIR EJECTOR

Q. Draw a diagrammatic sketch showing the flow diagram through a two-stage air ejector and all attendant condensers.



SUMMARY OF MERCHANT MARINE COUNCIL PUBLIC HEARING HELD MARCH 12, 1962, AT WASHINGTON, D.C.

The Commandant, U.S. Coast Guard, announced the general acceptance of proposed changes to the vessel inspection regulations as recommended by the Merchant Marine Council at its annual session held 12–14 March 1962. The recommendations are based on proposals contained in a Merchant Marine Council Public Hearing Agenda, CG–249, dated 12 March 1962, consisting of nine items; an addendum to Item 5, dated 5 February 1962; and the oral and written comments submitted by the public in conjunction with the public hearing held 12 March 1962.

The proposals considered were:

1. Rules and Regulations for Military Explosives and Hazardous Munitions.
2. Dangerous Cargoes.
3. Vessel Operations and Inspection.
4. Lifesaving and Fire Protection.
5. Tank Vessels.
6. Marine Engineering.
7. Electrical Engineering.
8. Uninspected Vessels (Motorboats).
9. Artificial Islands and Fixed Structures on the Outer Continental Shelf.

The Commandant accepted the proposed changes to the regulations, with certain changes from the agenda which reflect views expressed in comments received, for Items 1, 2, 4, 7, and 9, as well as the majority of proposals in Items 3, 5, and 6. These changes in the regulations will be published in the Federal Register as soon as possible.

The proposals regarding "immediate reporting of spillages, etc., of dangerous materials or liquids" in Item 3 are withdrawn as regulatory material. In lieu thereof, publicity will be given to the problems and suggested practices and procedures will be published as articles in the Proceedings of the Merchant Marine Council or Navigation and Vessel Inspection Circulars.

Many comments were received concerning "portable containers for combustible liquid cargoes" indicating a need for a further study of this subject. Therefore, these proposals and comments are being studied by a special committee before taking final action.

With respect to "gas freeing, inspection and testing required when making alterations, repairs, etc., involving hot work," certain comments indicated there were a number of important changes occurring regarding certified gas chemists. Therefore, the final actions on proposals and comments are deferred until after 15 June.

Requests were received asking for additional time for submitting comments regarding the two proposals for inspection and certification of "seagoing barges." An additional 90-day extension of time is granted, and final actions on proposals and comments are deferred until after 15 June.

The comments received concerning "oxygen type breathing apparatus (liquid chlorine and anhydrous ammonia)" indicate a need to resolve corollary problems concerning alternate places for keeping this equipment and possible use of alternate types of equipment. Therefore, exploratory discussions with those who submitted certain comments on this will be held. An additional 90-day extension of time is granted for submittal of comments, and final actions on proposals and comments are deferred until after 15 June.

The proposal regarding "portable fire extinguishers" in Item 4 was controversial. Many comments indicate that problems exist with regard to the inspection of dry chemical extinguishers with disposable containers without pressure gages. The proposals and comments concerning the inspection and labeling of these extinguishers are being studied by a special committee and final action will be taken shortly.

The proposals regarding "venting of cofferdams," as described in Item 5 and the addendum to Item 5, dated 5 February 1962, were withdrawn for further study. The comments received indicate a divergence in opinions on the proposals and problems involved, and further discussions with those who submitted comments will be held.

At the public hearing a verbal request was made for 10 days' additional time in which to submit written comments regarding "valves and fittings" in the proposals on "pressure vessels, dished heads, malleable iron, piping, bilge pumps and valves" in Item 6. This additional 10-day extension of time for submitting comments on "valves and fittings" is granted, and final actions on proposals and comments are deferred until after 2 April.

With respect to "vent opening closures" in Item 6, the Merchant Marine Council rejected the proposals as set forth in the agenda and stated the present regulations shall continue in effect, after considering the comments and proposals. These proposals concerned the meaning of the term "satisfactory means" for closing openings of vent pipes in section 55.10–60 of the marine engineering regulations, and for closing openings of air pipes in sections 43.10–80 and 45.10–77 of the load line regulations.

The proposals in Item 8 concerned motorboats. The comments concerning the interpretation of the expression "length shall be measured from end to end over the deck excluding sheer" were, for the most part, very favorable to the proposal. Therefore, this interpretation as set forth in the agenda is adopted. The proposals concerning "portable fire extinguishers for all motorboats" and "ventilation" were commented on extensively, and a few set forth proposed modifications. Therefore, final actions are deferred until after further study is completed by the Coast Guard and also by two advisory panels to the Merchant Marine Council; namely, the Motorboat and Yacht Advisory Panel, and the Advisory Panel of State Officials. Until this study is completed and the recommendations of these two panels are considered, the existing regulations concerning fire extinguishers and ventilation for uninspected motorboats will remain unchanged.

CUSTOMS PROPOSAL

Revised ruling on water-ballast spaces is proposed by the Bureau of Customs. The object is to preclude deduction from gross tonnage of water ballast unless the Bureau is satisfied that the primary purpose of the space is to afford means of maintaining satisfactory draft, stability, or trim under varying conditions of the vessel's operation and that the space is available at all times for this purpose. In addition, special procedures are prescribed in the event of any application for exemption of water-ballast space in excess of 30 percent of gross tonnage. Under current rules, water-ballast spaces not available for the carriage of cargo, stores, supplies, or fuel are deducted from gross tonnage as measured to get the gross register tonnage of a vessel.

IT IS WITH REGRET that we announce the recent death of an outstanding personality in the maritime field, Mr. Walter L. Green.

Mr. Green's maritime career began upon his graduation from Pratt Institute in 1914 and his association with the Luckenbach Steamship Co. He was subsequently associated with the American Bureau of Shipping, Todds Shipyard Corp., the Seattle-Tacoma Shipbuilding Corp., and the New England Shipbuilding Corp. In 1950, Mr. Green was elected to the presidency of the American Bureau of Shipping, and in 1952 was elected chairman of the Bureau's board of managers. Upon his retirement in 1959, he was elected honorary vice president of the Bureau.

During his distinguished career Mr. Green served as president of both the Society of Naval Architects & Marine Engineers and the Webb Institute of Naval Architecture. He also served as a member of the advisory committee of the United States Coast Guard Academy. Other activities included chairmanship of the Welding Research Council of the Engineering Foundation, and membership in the Metropolitan Club, India House, Whitehall Club, Propeller Club of the United States, Northeast Coast Institution of Engineers & Shipbuilders of Glasgow, Scotland, the Institute of Marine Engineers of London, and the American Society of Mechanical Engineers.

Mr. Green received many awards for his maritime accomplishments. Among these was the "Vice Admiral 'Jery' Land Gold Medal" presented him by the Society of Naval Architects & Marine Engineers in 1955.

ST. LAWRENCE SEAWAY RULES

Revised regulations governing vessels transiting the St. Lawrence Seaway have been issued recently. The rules are to be effective beginning with the 1962 season. A few of the rules appear below:

● Subject to these regulations, every vessel that does not exceed 715 feet in overall length and 72 feet in beam may transit during the navigation season.

● No vessel shall transit unless the maximum draft of the vessel does not exceed the draft currently prescribed by the Authority for the part of the Seaway in which the vessel is traveling.

● No vessel shall be towed through any part of the Seaway by another vessel or vessels, except in compliance with all conditions prescribed by the Authority in respect of towing and in compliance with any special instructions of an officer.

● No vessel shall transit:

Until an application for preclearance has been made to the Authority by its representative and the application has been approved by the Authority; or

While its preclearance is suspended.

● No vessel shall transit unless:

It is properly trimmed and in a condition determined by the Authority or an officer to be safe and satisfactory to it or him; and

It is equipped with such apparatus, equipment or machinery as the Authority deems necessary for safe transit.

● All self-propelled vessels in transit or approaching the Seaway, except pleasure craft of less than 65 feet in overall length, shall:

Be on radio-listening watch; and

Give notice of arrival in the manner prescribed by the Authority upon reaching any calling-in point designated by the Authority.

Notice of arrival shall be deemed to have been given when it is acknowledged by a station.

AMVER

An extensive, 340,000-square-mile search for a B–50 bomber missing between Norfolk and the Azores was conducted during January of this year. Air and sea efforts continued for 8 days but failed to reveal the fate of the aircraft. The AMVER system played an undramatic but important role in the search. Merchant vessels assisting in the effort included:

M/V *La Selva*
M/V *Hellenic Laurel*
SS *Texaco Anacortes*
SS *Edgar F. Luckenbach*
SS *Exemplar*
M/V *Edmund Hugo Stinnes*
SS *Alert*
SS *Remsen Heights*/WCVT
SS *Bulkoceanic*/ELAO
SS *Erviken*/LAGI
SS *Exeter*/KUWL
MV *Ganja*/LAXB
MV *Golfo Di Palermo*/ICRG
SS *Green Harbour*/WEDE
MV *Grundsundo*/SGBN
MV *Holdendrecht*/PESI
MV *Johannes Russ*/DIHS
SS *Leonardo Da Vinci*/ICLN
SS *Margarita*/ELLJ
MV *Olesnica*/SPNK
SS *President Jackson*/KFCT
SS *African Crescent*/KAAQ
MV *Ruahine*/GKSY
SS *San Gregorio*/MXKK
MV *Skaugum*/LNBL
SS *Vinkt*/ONVI
SS *Vire*/FPSG

While a failure to recover those involved in a maritime disaster is always disappointing, much satisfaction should be taken in the knowledge that a vigorous effort was made by all concerned. Such combined searches, possible only with the utmost of cooperation, have resulted in the saving of many lives. Perhaps even greater participation could improve the outstanding record already obtained by the AMVER system.

SAR NOTE: In cases of this type it would be very helpful if more vessels sighting debris or other objects of possible connection recover them if at all practicable. Positive identification may be very important. Relocation of small objects by SAR vessels takes much valuable time.

EQUIPMENT APPROVED BY THE COMMANDANT

[EDITOR'S NOTE.—Due to space limitations, it is not possible to publish the documents regarding approvals and terminations of approvals of equipment published in the Federal Register dated March 15, 1962 (CGFR 62-2). Copies of these documents may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D.C.]

ARTICLES OF SHIPS' STORES AND SUPPLIES

Articles of ships' stores and supplies certificated from 1 March to 31 March 1962, inclusive, for use on board vessels in accordance with the provisions of Part 147 of the regulations governing "Explosives or Other Dangerous Articles on Board Vessels" are as follows:

CERTIFIED

Wyandotte Chemicals Corp., Wyandotte, Mich.:

Certificate No. 161, dated 1 March 1962, WYANDOTTE TANK CLEANER.

Certificate No. 194, dated 1 March 1962, WYANDOTTE SPILL REMOVER.

Certificate No. 239, dated 9 March 1962, WYANDOTTE MERSOSTRIP.

Certificate No. 248, dated 9 March 1962, WYANDOTTE NUVAT.

Maritec Corp., 42 Broadway, New York 4, N.Y.:

Certificate No. 254, dated 15 March 1962, MARITEC DEGREASER-FORMULA 12.

Certificate No. 276, dated 15 March 1962, MARITEC ROLL-KLEEN.

CANCELED

(Failed to renew in accordance with 46 CFR 147.03-9)

West Chemical Products, Inc., 42-16 West St., Long Island City 1, N.Y.:

Certificate No. 135, dated 1 March 1962, STEAMSHIP VAPOSECTOR FLUID.

Certificate No. 142, dated 1 March 1962, STEAMSHIP WINTERGREEN.

Certificate No. 298, dated 1 March 1962, HYDROFECT.

Certificate No. 332, dated 1 March 1962, KARSPRAY.

Magnus Chemical Co., Inc., Garwood, N.J.:

Certificate No. 324, dated 1 March 1962, MAGNUS AUTOMATIC TANK WASH.

Certificate No. 326, dated 1 March 1962, MAGKLEEN #1.

NOTICE

REGULATIONS of the Congressional Joint Committee on Printing and Binding require annual verification of all mailing lists maintained for the purpose of free distribution of Government publications.

All addressees on the mailing list for the PROCEEDINGS have been sent a card requesting that an affirmative reply be returned to the Commandant (CMC), United States Coast Guard, Washington 25, D.C.

Certificate No. 329, dated 1 March 1962, MAGNUS DEGREASER 7-11.

Certificate No. 330, dated 1 March 1962, MAGNUS FUEL OIL TREATMENT.

Certificate No. 331, dated 1 March 1962, MAGNUS LUBRIFIN.

Certificate No. 333, dated 1 March 1962, MAGNUS SUPER SCALE SOLVE.

Certificate No. 352, dated 1 March 1962, MAGNUS FUEL OIL TREATMENT SPECIAL.

Purex Corp., Ltd., Post Office Box 9686, Philadelphia 31, Pa.:

Certificate No. 451, dated 1 March 1962, PUREX SPECIAL ANTI-SLIP FLOOR WAX.

Certificate No. 452, dated 1 March 1962, PUREX BRYTENE NON-SCUFF POLYMER FLOOR POLISH.

Certificate No. 453, dated 1 March 1962, PUREX SPOTLIGHT SELF-POLISHING FLOOR WAX.

Dow Chemical Co., Midland, Mich., Certificate No. 203, dated 1 March 1962, 1,1,1,-TRICHLOROETHLANE, INHIBITED.

Nalco Chemical Co., 6216 West 66th Pl., Chicago 38, Ill., Certificate No. 363, dated 1 March 1962, NALCO SR-155.

E. F. Drew & Co., Inc., 15 East 26th St., New York 10, N.Y., Certificate No. 335, dated 1 March 1962, DREW OIL REMOVER.

Morton Chemical Co., Woodstock, Ill., Certificate No. 127, dated 1 March 1962, L-P INDUSTRIAL SPRAY.

Barash & Douglas, 236 Commercial St., San Francisco 11, Cal., Certificate No. 344, dated 1 March 1962, NC 311.

Chemical Testing Corp., 32-10 37th Ave., Long Island City 1, N.Y., Certificate No. 328, dated 1 March 1962, ACTIVATED DISOLVITE FUEL OIL TREATMENT.

Commercial Chemical Products, Inc., 11 Paterson Ave., Midland Park, N.J., Certificate No. 172, dated 1 March 1962, DISPERSITE-M.

Dearborn Chemical Corp., Merchandise Mart Plaza, Chicago 54, Ill., Certificate No. 467, dated 1 March 1962, DEARSOL 92.

Dominion Chemical Co., Inc., 33 West 42d St., New York 36, N.Y., Certificate No. 214, dated 1 March 1962, NO-SLUDGE X FUEL OIL TREATMENT.

Division of Humble Oil & Refining Co., Esso Standard Oil, 15 West 51st St., New York 19, N.Y., Certificate No. 380, dated 1 March 1962, FLIT MARINE AEROSOL.

Fulmar Chemical Co., 71 East Centennial Ave., Roosevelt, Long Island, N.Y., Certificate No. 174, dated 1 March 1962, FULMAR ALL PURPOSE CLEANER.

Hagan Chemical & Controls, Inc., Postoffice Box 1346, Pittsburgh 30, Pa., Certificate No. 201, dated 1 March 1962, HAGAMIN (MARINE FORM).

RECERTIFIED

West Chemical Products, Inc., 42-16 West St., Long Island City 1, N.Y., Certificate No. 132, dated 27 March 1962, VAPOSECTOR.

AFFIDAVITS

The following affidavits were accepted during the period from 15 February 1962 to 15 March 1962:

Oscar Krenz Inc., Ashby Ave. and Sixth St., Berkeley 10, Calif., PIPING and TUBING (nonferrous) and FITTINGS.

Industrial Iron Works, Postoffice Box 4691, Portland 2, Oreg., PIPE and TUBING (ferrous), FITTINGS, FLANGES, and CASTINGS.

Erie Forge & Steel Corp., 1341 W. 16th St., Erie, Pa., CASTINGS and FORGINGS.

American Brake Shoe Co., 530 Fifth Ave., New York 36, N.Y., VALVES.

The Hica Corp., Postoffice Box 6065, Shreveport, La., FITTINGS, FLANGES, and CASTINGS.

O-T-M Corp., 7430 Katy Rd., Postoffice Box 7722, Houston 24, Tex., FITTINGS and FLANGES.

Columbian Bronze Corp., 216 North Main St., Freeport, Long Island, N.Y., VALVES.

Fabri-Valve Co. of America, Postoffice Box 4352, Portland 8, Oreg., VALVES.

Sumitomo Light Metal Industries, Ltd., 1-2 Marunouchi Chiyoda-Ku, Tokyo, Japan, PIPE and TUBING (nonferrous).

Cann & Saul Steel Co., Royersford, Pa., FLANGES and FORGINGS.

Exner-Dodge, Inc., 309 East 4th St., Postoffice Box 565, Coffeyville, Kans., FITTINGS and FORGINGS.

Yawata Steel Tube Co., Ltd., 2-2 Marunouchi, Chiyoda-Ku, Tokyo, Japan, PIPE and TUBING (ferrous).

Nippon Kokan Kabushiki Kaisha, 1-Chome, Otemachi Chiyoda-Ku, Tokyo, Japan, PIPE and TUBING (ferrous).

MERCHANT MARINE SAFETY PUBLICATIONS

The following publications that are directly applicable to the Merchant Marine are available and may be obtained upon request from the nearest Marine Inspection Office of the United States Coast Guard. The date of each publication is indicated in parentheses following its title. The dates of the Federal Registers affecting each publication are noted after the date of each edition.

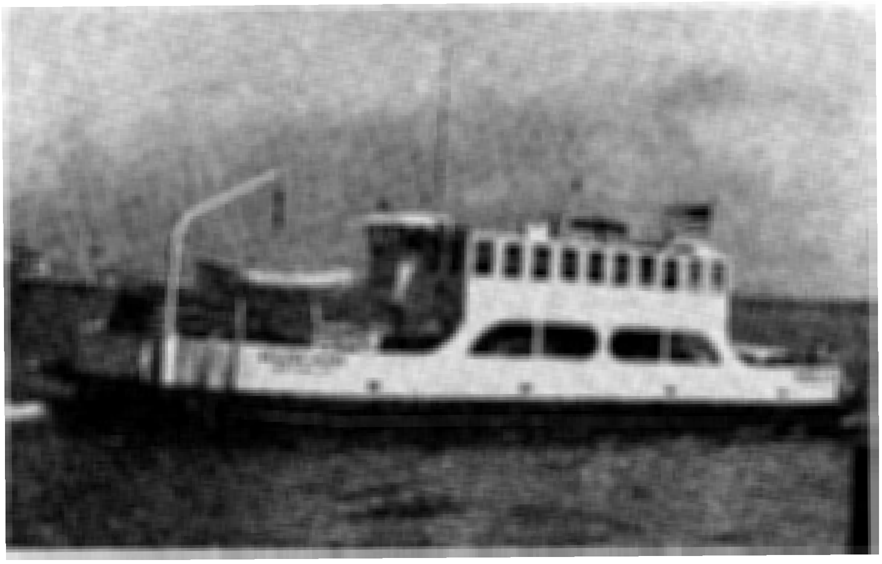
CG No.	TITLE OF PUBLICATION
101	Specimen Examination for Merchant Marine Deck Officers (7–1–58).
108	Rules and Regulations for Military Explosives and Hazardous Munitions (8–1–58).
115	Marine Engineering Regulations and Material Specifications (2–1–61).
123	Rules and Regulations for Tank Vessels (1–2–62).
129	Proceedings of the Merchant Marine Council (Monthly).
169	Rules of the Road—International—Inland (5–1–59). F.R. 5–21–59, 6–6–59, 5–20–60, 9–21–60, 4–14–61, 4–25–61.
172	Rules of the Road—Great Lakes (5–1–59). F.R. 1–7–60, 3–17–60, 5–20–60, 9–21–60.
174	A Manual for the Safe Handling of Inflammable and Combustible Liquids (7–2–51).
175	Manual for Lifeboatman, Able Seamen, and Qualified Members of Engine Department (9–1–60).
176	Load Line Regulation (9–1–61).
182	Specimen Examinations for Merchant Marine Engineer Licenses (12–1–59).
184	Rules of the Road—Western Rivers (5–1–59). F.R. 6–6–59, 5–20–60, 9–21–60, 10–8–60, 12–23–60, 4–14–61, 4–25–61.
190	Equipment Lists (4–1–60). F.R. 6–21–60, 8–16–60, 8–25–60, 8–31–60, 9–21–60, 9–28–60, 10–25–60, 11–17–60, 12–23–60, 12–24–60, 5–2–61, 6–2–61, 6–8–61, 7–21–61, 7–27–61, 8–16–61, 8–29–61, 8–31–61, 9–8–61, 9–9–61, 10–18–61, 11–3–61, 11–18–61, 12–12–61, 2–9–62, 2–17–62, 3–15–62.
191	Rules and Regulations for Licensing and Certificating of Merchant Marine Personnel (11–1–60). F.R. 11–30–60, 1–4–61, 4–19–61, 10–25–61.
200	Marine Investigation Regulations and Suspension and Revocation Proceedings (7–1–58). F.R. 3–30–60, 5–6–60, 12–8–60, 7–4–61.
220	Specimen Examination Questions for Licenses as Master, Mate, and Pilot of Central Western Rivers Vessels (4–1–57).
227	Laws Governing Marine Inspection (7–3–50).
239	Security of Vessels and Waterfront Facilities (8–1–61). F.R. 12–12–61.
249	Merchant Marine Council Public Hearing Agenda (Annually).
256	Rules and Regulations for Passenger Vessels (1–2–62).
257	Rules and Regulations for Cargo and Miscellaneous Vessels (3–2–59). F.R. 4–25–59, 6–18–59, 6–20–59, 7–9–59, 7–21–59, 9–5–59, 5–6–60, 5–12–60, 10–25–60, 11–5–60, 11–17–60, 12–8–60, 12–24–60, 7–4–61, 9–30–61, 10–25–61, 12–13–61.
259	Electrical Engineering Regulations (12–1–60). F.R. 9–30–61.
266	Rules and Regulations for Bulk Grain Cargoes (5–1–59). F.R. 1–18–62.
268	Rules and Regulations for Manning of Vessels (9–1–60). F.R. 5–5–61, 6–28–61, 12–16–61.
269	Rules and Regulations for Nautical Schools (3–1–60). F.R. 3–30–60, 8–18–60, 11–5–60, 7–4–61, 9–30–61, 12–13–61.
270	Rules and Regulations for Marine Engineering Installations Contracted for Prior to July 1, 1935 (11–19–52). F.R. 12–5–53, 12–28–55, 6–20–59, 3–17–60.
293	Miscellaneous Electrical Equipment List (3–7–60).
320	Rules and Regulations for Artificial Islands and Fixed Structures on the Outer Continental Shelf (10–1–59). F.R. 10–25–61, 11–3–61.
323	Rules and Regulations for Small Passenger Vessels (Not More Than 65 Feet in Length) (7–1–61).
329	Fire Fighting Manual for Tank Vessels (4–1–58).

Official changes in rules and regulations are published in the Federal Register, which is printed daily except Sunday, Monday, and days following holidays. The Federal Register is a sales publication and may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D.C. It is furnished by mail to subscribers for $1.50 per month or $15 per year, payable in advance. Individual copies desired may be purchased as long as they are available. The charge for individual copies of the Federal Register varies in proportion to the size of the issue and will be 15 cents unless otherwise noted in the table of changes below.

CHANGES PUBLISHED DURING MARCH 1962

The following has been modified by Federal Registers:

CG–190, Federal Register March 15, 1962.



M/V SHELTER ISLAND

A double-ended steel ferry the *Shelter Island* has been placed in operation between Shelter Island and Greenport, N.Y. The vessel, built for the Shelter Island & Greenport Ferry Co. by Gladding-Hearn Shipbuilding Corp., was launched in April 1961. The new vessel replaces a smaller wooden craft of the same name on the 1-mile run between the eastern Long Island towns.

The 84-foot by 29.5-foot by 8.5-foot craft is inspected by the Coast Guard in accordance with regulations applicable to vessels of less than 100 gross tons. The vessel's operator must hold a license as Operator of Mechanically-propelled Passenger-carrying vessels.

The vessel is permitted to carry 150 persons and approximately 14 automobiles or vehicles such that the total load carried shall not exceed 47 short tons.

HULL STRUCTURE

The hull is of electrically welded steel transversely framed with $\frac{1}{4}$-inch bottom plating, $\frac{3}{8}$-inch sides and $\frac{5}{16}$-inch patterned deck plate. Reinforced brow shelves at each end and multiple-layered guard strakes along the sides protect the hull from frequent contact with pilings and fendering of the landing slips.

Ice-breaking posts at each end protect rudders and hull from damage during severe winter weather.

MAIN PROPULSION

The main engine consists of 225 h.p., 1,225 rpm. Caterpillar Diesel, located off the centerline, which is belt-connected to the 74-foot main shaft. At each end of the five-part shaft is attached a three-bladed propeller, especially designed for this vessel. The propellers thus turn together, one pushing and the other pulling, regardless of the vessel's direction.

FEATURES

Several features incorporated into the construction of the boat reflect the experience of her operators and the peculiarities of the run. A small rotary blower is driven from the vee-belt idler shaft and distributes the warm engine-room air to the other under-deck compartments through a system of ductwork. This eliminates any condensation in these spaces by the circulation of air and is expected to result in a maintenance-free hull interior.

An electrical magnesin compass system using a master compass on an aluminum mast 6 feet above the deck house and repeaters in each pilot house remains free of deviation occurring in magnetic compasses due to the presence of large trucks and irregular disposition of magnetic loads. At each end, rolling aluminum plate gates extend from the bulwark to keep the deck free of spray from the short choppy seas common to the run and also provide an additional measure of safety for passengers and vehicles.

Each pilot house is fitted out with ship to shore phone, electric windshield wiper, hydraulic engine controls, general alarm contact makers, and a steering mechanism with provisions for automatically locking the forward rudder in center position.

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