# 1. GENERAL INFORMATION

(1) The UNITED STATES COAST PILOT.–The National Ocean Service Coast Pilot is a series of nine nautical books that cover a wide variety of information important to navigators of U.S. coastal and intracoastal waters, and the waters of the Great Lakes. Most of this book information cannot be shown graphically on the standard nautical charts and is not readily available elsewhere. The subjects in the Coast Pilot include, but are not limited to, channel descriptions, anchorages, bridge and cable clearances, currents, tide and water levels, prominent features, pilotage, towage, weather, ice conditions, wharf descriptions, dangers, routes, traffic separation schemes, small-craft facilities, and Federal regulations applicable to navigation.

(2) **Notice-Amendments are issued to this publication through U.S. Coast Guard Local Notices to Mariners, or by contacting the NOS internet website address, http://critcorr.ncd.noaa.gov. A subscription to the Local Notice to Mariners is available upon application to the appropriate Coast Guard District Commander (Aids to Navigation Branch). Consult appendix for address. All amendments are also issued in National Imagery and Mapping Agency Notices to Mariners.**

(3) **Bearings .**–These are true, and expressed in degrees from 000°(north) to 359°, measured clockwise. General bearings are expressed by initial letters of the points of the compass (e.g., N, NNE, NE, etc.). Adjective and adverb endings, except in chapter 2, Navigation Regulations, have been discarded. Whenever precise bearings are intended degrees are used. Light-sector bearings are toward the light.

(4) **Bridges and cables.**–Vertical clearances of bridges and overhead cables are in feet (meters) above mean high water unless otherwise stated; clearances of drawbridges are for the closed position, although the open clearances are also given for vertical-lift bridges. Clearances given in the Coast Pilot are those approved for nautical charting, and are supplied by the U.S. Coast Guard (bridges) and U.S. Army Corps of Engineers (cables); they may be as-built (verified by actual inspection after completion of structures) or authorized (design values specified in permit issued prior to construction). No differentiation is made in the Coast Pilot between as-built and authorized clearances. (See charts for horizontal clearances of bridges, as these are given in the Coast Pilot only when they are less than 50 feet (15 meters).) Submarine cables are rarely mentioned.

(5) **Cable ferries.**–Cable ferries are guided by cables fastened to shore and sometimes propelled by a cable rig attached to the shore. Generally, the cables are suspended during crossings and dropped to the bottom when the ferries dock. Where specific operating procedures are known they are mentioned in the text. Since operating procedures vary, mariners are advised to exercise extreme caution and seek local knowledge. **DO NOT ATTEMPT TO PASS A MOVING CABLE FERRY.**

(6) **Courses.**–These are true and are given in degrees clockwise from 000°(north) to 359°. The courses given are the courses to be made good.

(7) **Currents.**–Stated current velocities are the averages at strength. Velocities are in knots, which are nautical miles per hour. Directions are the true directions to which the currents set.

(8) **Depths.**–Depth is the vertical distance from the chart datum to the bottom and is expressed in the same units (feet, meters or fathoms) as soundings on the applicable chart. (See Chart Datum this chapter for further detail.) The **controlling depth** of a channel is the least depth within the limits of the channel; it restricts the safe use of the channel to drafts of less than that depth. The **centerline controlling depth** of a channel applies only to the channel centerline; lesser depths may exist in the remainder of the channel. The **midchannel controlling depth** of a channel is the controlling depth of only the middle half of the channel. **Federal project depth** is the design dredging depth of a channel constructed by the U.S. Army Corps of Engineers; the project depth may or may not be the goal of maintenance dredging after completion of the channel, and, for this reason, project depth must not be confused with controlling depth. **Depths alongside wharves** usually have been reported by owners and/or operators of the waterfront facilities, and have not been verified by Government surveys; since these depths may be subject to change, local authorities should be consulted for the latest controlling depths.

(9) In general, the Coast Pilot gives the project depths for deep-draft ship channels maintained by the U.S. Army Corps of Engineers. The latest controlling depths are usually shown on the charts and published in the Notices to Mariners. For other channels, the latest controlling depths available at the time of publication are given. **In all cases, however, mariners are advised to consult with pilots, port and local authorities, and Federal and State authorities for the latest channel controlling depths.**

(10) **Under-keel clearances.**–It is becoming increasingly evident that economic pressures are causing mariners to navigate through waters of barely adequate depth, with under - keel clearances being finely assessed from the charted depths, predicted tide levels, and depths recorded by echo sounders.

(11) It cannot be too strongly emphasized that even charts based on modern surveys may not show all sea-bed obstructions or the shoalest depths, and actual tide levels may be appreciably lower than those predicted.

(12) In many ships an appreciable correction must be applied to shoal soundings recorded by echo sounders due to the horizontal distance between the transducers. This separation correction, which is the amount by which recorded depths therefore exceed true depths, increases with decreasing depths to a maximum equal to half the distance apart of the transducers; at this maximum the transducers are aground. Ships whose transducers are more than 6 feet (1.8 meters) apart should construct a table of true and recorded depths using the Traverse Tables. (Refer to discussion of echo soundings elsewhere in chapter 1.)

(13) Other appreciable corrections, which must be applied to many ships, are for settlement and squat. These corrections depend on the depth of water below the keel, the hull form and speed of the ship.

(14) Settlement causes the water level around the ship to be lower than would otherwise be the case. It will always cause echo soundings to be less than they would otherwise be. Settlement is appreciable when the depth is less than seven times the draft of the ship, and increases as the depth decreases and the speed increases.

(15) Squat denotes a change in trim of a ship underway, relative to her trim when stopped. It usually causes the stern of a vessel to sit deeper in the water. However, it is reported that in the case of mammoth ships squat causes the bow to sit deeper. Depending on the location of the echo sounding transducers, this

may cause the recorded depth to be greater or less than it ought to be. **Caution and common sense are continuing requirements for safe navigation.**

(16) **Distances.**–These are in nautical miles unless otherwise stated. A nautical mile is one minute of latitude, or approximately 2,000 yards, and is about 1.15 statute miles.

(17) In this publication, the mileages in chapter 8, Mississippi River, are in statute miles.

(18) **Heights.**–These are in feet (meters) above the tidal datum used for that purpose on the charts, usually mean high water. However, the heights of the decks of piers and wharves are given in feet (meters) above the chart datum for depths.

(19) **Light and fog signal characteristics.** These are not described, and light sectors and visible ranges are normally not defined. (See Coast Guard Light Lists.)

(20) **Obstructions.**–Wrecks and other obstructions are mentioned only if of a relatively permanent nature and in or near normal traffic routes.

(21) **Radio aids to navigation.**–These are seldom described. (See Coast Guard Light Lists and National Imagery and Mapping Agency Radio Navigational Aids.)

(22) **Ranges.**–These are not fully described. "**A 339° Range**" means that the rear structure bears 339° from the front structure. (See Coast Guard Light Lists.)

(23) **Reported information.**–Information received by NOS from various sources concerning depths, dangers, currents, facilities, and other subjects, which has not been verified by Government surveys or inspections, is often included in the Coast Pilot; such **unverified information** is qualified as "reported," and should be regarded with caution.

(24) **Time.**–Unless otherwise stated, all times are given in local standard time in the 24-hour system. (Noon is 1200, 2:00 p.m. is 1400, and midnight is 0000.)

(25) **Winds.**–Directions are the true directions from which the winds blow. Unless otherwise indicated, speeds are given in knots, which are nautical miles per hour.

## NOTICES TO MARINERS

(26) Notices to Mariners are published by Federal agencies to advise operators of vessels of marine information affecting the safety of navigation. The notices include changes in aids to navigation, depths in channels, bridge and overhead cable clearances, reported dangers, and other useful marine information. They should be used routinely for updating the latest editions of nautical charts and related publications.

(27) **Local Notice to Mariners** is issued by each Coast Guard District Commander for the waters under his jurisdiction. (See appendix for Coast Guard district(s) covered by this volume.) These notices are usually published weekly and may be obtained without cost by making application to the appropriate District Commander, or by contacting the Coast Guard internet website address, **http://www.navcen.uscg.gov/lnm.**

(28) **Notice to Mariners,** published weekly by the National Imagery and Mapping Agency, is prepared jointly with NOS and the Coast Guard. These notices contain selected items from the Local Notices to Mariners and other reported marine information required by oceangoing vessels operating in both **foreign** and **domestic** waters. Special items covering a variety of subjects and generally not discussed in the Coast Pilot or shown on nautical charts are published annually in Notice to Mariners No. 1. These items are important to the mariner and should be read for future reference. These notices may be obtained by operators or oceangoing vessels, without cost by making application to **National Imagery and Mapping Agency** (see National Imagery and Mapping Agency Procurement Information in appendix).

(29) All active Notice to Mariners effecting Tide and/or Tidal Current Predictions at the date of printing are published in the Tide Tables and the Tidal Current Tables annually.

(30) Notices and reports of **improved channel depths** are also published by district offices of the U.S. Army Corps of Engineers (see appendix for districts covered by this volume). Although information from these notices/reports affecting NOS charts and related publications is usually published in the Notices to Mariners, the local district engineer office should be consulted where depth information is critical.

(31) **Marine Broadcast Notices to Mariners** are made by the Coast Guard through Coast Guard, Navy, and some commercial radio stations to report deficiencies and important changes in aids to navigation. (See Radio Navigation Warnings and Weather, this chapter.)

(32) Vessels operating within the limits of the Coast Guard districts can obtain information affecting NOS charts and related publications from the Local Notices to Mariners. Small craft using the Intracoastal Waterway and other waterways and small harbors within the United States that are not normally used by oceangoing vessels will require the Local Notices to Mariners to keep charts and related publications up-to-date.

## U.S. GOVERNMENT AGENCIES PROVIDING MARITIME SERVICES

(33) **Animal and Plant Health Inspection Service,** Department of Agriculture.–The Agricultural Quarantine Inspection Program and Animal Health Programs of this organization are responsible for protecting the Nation's animal population, food and fiber crops, and forests from invasion by foreign pests. They administer agricultural quarantine and restrictive orders issued under authority provided in various acts of Congress. The regulations prohibit or restrict the importation or interstate movement of live animals, meats, animal products, plants, plant products, soil, injurious insects, and associated items that may introduce or spread plant pests and animal diseases which may be new to or not widely distributed within the United States or its territories. Inspectors examine imports at ports of entry as well as the vessel, its stores, and crew or passenger baggage.

(34) The Service also provides an inspection and certification service for exporters to assist them in meeting the quarantine requirements of foreign countries. (See appendix for a list of ports where agricultural inspectors are located and inspections conducted.)

(35) **Customs Service,** Department of the Treasury.–The U.S. Customs Service administers certain laws relating to: entry and clearance of vessels and permits for certain vessel movements between points in the United States; prohibitions against coastwise transportation of passengers and merchandise; salvage, dredging and towing by foreign vessels; certain activities of vessels in the fishing trade; regular and special tonnage taxes on vessels; the landing and delivery of foreign merchandise (including unlading, appraisement, lighterage, drayage, warehousing, and shipment in bond); collection of customs duties, including duty

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on imported pleasure boats and yachts and 50% duty on foreign repairs to American vessels engaged in trade; customs treatment of sea and ship's stores while in port and the baggage of crewmen and passengers; illegally imported merchandise; and remission of penalties or forfeiture if customs or navigation laws have been violated. The Customs Service also cooperates with many other Federal agencies in the enforcement of statutes they are responsible for. Customs districts and ports of entry, including customs stations, are listed in the appendix.

(36) The Customs Service may issue, without charge, a **cruising license,** valid for a period of up to 6 months and for designated U.S. waters, to a yacht of a foreign country which has a reciprocal agreement with the United States. A foreign yacht holding a cruising license may cruise in the designated U.S. waters and arrive at and depart from U.S. ports without entering or clearing at the customhouse, filing manifests, or obtaining or delivering permits to proceed, provided it does not engage in trade or violate the laws of the United States or visit a vessel not yet inspected by a Customs Agent and does, within 24 hours of arrival at each port or place in the United States, report the fact of arrival to the nearest customhouse. Countries which have reciprocal agreements granting these privileges to U.S. yachts are Argentina, Australia, Bahama Islands, Bermuda, Canada, Federal Republic of Germany, Great Britain, Greece, Honduras, Jamaica, Liberia, the Netherlands, and New Zealand. Further information concerning cruising licenses may be obtained from the headquarters port for the customs district in which the license is desired. U.S. yacht owners planning cruises to foreign ports may contact the nearest customs district headquarters as to customs requirements.

(37) **National Ocean Service (NOS)**, National Oceanic and Atmospheric Administration (NOAA), Department of Commerce.–The National Ocean Service provides charts and related publications for the safe navigation of marine and air commerce, and provides basic data for engineering and scientific purposes and for other commercial and industrial needs. The principal facilities of NOS are located in Silver Spring, Md.; in Norfolk, Va. (Atlantic Marine Center); and in Seattle, Wash. (Pacific Marine Center). NOAA ships are based at the marine centers. These offices maintain files of charts and other publications which are available for the use of the mariners, who are invited to avail themselves of the facilities afforded. (See appendix for addresses.)

(38) **Sales agents** for Charts, the Coast Pilot, Tide Tables, Tidal and Current Tables, and Tidal Current Charts of the National Ocean Service are located in many U.S. ports and in some foreign ports.

(39) **Nautical charts** are published primarily for the use of the mariner, but serve the public interest in many other ways. They are compiled principally from NOS basic field surveys, supplemented by data from other Government organizations.

(40) **Tide Tables** are computed annually by NOS in advance of the year for which they are prepared. These tables include predicted times and heights of high and low waters for every day in the year for a number of reference stations and differences for obtaining similar predictions for numerous other places. They also include other useful information such as a method of obtaining heights of tide at any time, local mean time of sunrise and sunset for various latitudes, reduction of local mean time to standard time, and time of moonrise and moonset for various ports.

(41) The Tide Tables and Tidal Current Tables for US waters contain the text of all active Notice to Mariners which effect the accuracy and use of tide and tidal current predictions they contain.

(42) Tide Tables and Tidal Current Tables are no longer printed by NOS and the Department of Commerce. Three private printers are printing Tables containing official NOS predictions. (See National Ocean Service Center for Operational Oceanographic Products and Services, indexed as such, in Appendix for addresses.)

(43) **Caution.**–In using the Tide Tables, slack water should not be confused with high or low water. For ocean stations there is usually little difference between the time of high or low water and the beginning of ebb or flood currents; but for places in narrow channels, landlocked harbors, or on tidal rivers, the time of slack current may differ by several hours from the time of high or low water. The relation of the times of high or low water to the turning of the current depends upon a number of factors, so that no simple general rule can be given. (To obtain the times of slack water, refer to the Tidal Current Tables.)

(44) **Tidal Current Tables** for the coasts of the United States are computed annually by NOS in advance of the year for which they are prepared. These tables include daily predictions of the times of slack water and the times and velocities of strength of flood and ebb currents for a number of waterways, together with differences for obtaining predictions for numerous other places. Also included is other useful information such as a method for obtaining the velocity of current at any time, duration of slack, coastal tidal currents, wind currents, combination of currents, and current diagrams. Some information on the Gulf Stream is included in the tables for the Atlantic coast.

(45) The Tide Tables and Tidal Current Tables for US waters contain the text of all active Notice to Mariners which effect the accuracy and use of tide and tidal current predictions they contain.

(46) Tide Tables and Tidal Current Tables are no longer printed by NOS and the Department of Commerce. Presently, three private printers are printing Tables containing official NOS predictions. (See National Ocean Service Center for Operational Oceanographic Products and Services, indexed as such, in Appendix for addresses.)

(47) **Tidal Current Charts** are not being maintained or reprinted. NOS has also withdrawn previous editions for distribution.

(48) **HOW TO OBTAIN TIDAL PREDICTIONS AND DATA FROM THE NATIONAL OCEAN SERVICE.**–NOS annually computes and prepares manuscripts for the Tide and Tidal Current Prediction Tables. NOS, however, no longer prints and distributes these Tables. The printing from official NOS manuscripts and the distribution of the Tables to sales agents are now done by three private printers. (See National Ocean Service Center for Operational Oceanographic Products and Services, indexed as such, in Appendix for addresses.) The role of NOS with regard to the publication of the Tables has been redefined to that of maintaining and updating the tidal prediction database from domestic and international sources and generating the annual predictions and associated information. The NOS ceased printing Tide Tables and Tidal Current Tables after the 1996 editions.

(49) The titles of the NOS publications affected are:

(50) Tide Tables–East Coast of North and South America including Greenland;

(51) Tide Tables–West Coast of North and South America including the Hawaiian Islands;

(52) Tide Tables–Central and Western Pacific Ocean and Indian Ocean;

(53) Tide Tables–Europe and West Coast of Africa including the Mediterranean Sea;

(54) Tide Current Tables–Atlantic Coast of North America;

(55) Tide Current Tables–Pacific Coast of North America and Asia;

(56) Publication of "Regional Tide and Tidal Current Tables-New York Harbor to Chesapeake Bay" and "Supplemental Tidal Predictions-Anchorage, Nikiski, Seldovia, and Valdez, Alaska" ceased after the 1996 edition.

(57) Although NOS no longer prints and distributes the Tables in book format, a complete set of Tables for each calender year is available on CD-ROM. The CD-ROM contains page images in PostScript format. A PostScript reader is also included to allow viewing documents on-screen. Also, a Postscript compatible printer is required to print Table pages.

(58) In addition to the CD-ROM, limited tide predictions may be obtained from the Center for Operational Oceanographic Products and Services' home page on the Internet (**http://www.co-ops.nos.noaa.gov**). Furthermore, NOS will continue to provide tide and tidal current predictions and associated information on the various media and in the various formats with which regular customers are familiar.

(59) Thus, all requests for tide and tidal current predictions and associated information continue to be welcome. Requests should be submitted in writing either by fax (**301-713-4500**), e-mail (**Tide.Predictions@noaa.gov**), or by letter (See National Ocean Service Center for Operational Oceanographic Products and Services, indexed as such, in Appendix for addresses.)

(60) As NOS is no longer printing and distributing the Tables in book-form, the NOS Nautical Chart Sales Agents will no longer obtain the Tables in book-form from the NOS Distribution Division. Instead, they may obtain quantities of the Tables for resale to the public from various private printers and distributors.

(61) The U.S. Coast Guard, through the Federal regulation 33 CFR 164.33, requires certain charts and publications be carried on board vessels of 1,600 gross tons and greater when traversing U.S. waters. NOS has been in contact with the U.S. Coast Guard concerning this regulation. Questions concerning this regulation should be addressed to Chief, Navigation Rules Branch, G-NVT-3, United States Coast Guard, Washington, D.C. 20593-0001, telephone (202) 267-0416; fax (202) 267-4826.

(62) Anyone with questions or comments regarding the above subject or private printers and distributors wishing more information should write, telephone, fax or e-mail to:

(63) National Ocean Service, NOAA

(64) Products and Services Division (N/OPS3)

(65) Center for Operational Oceanographic Products and Services

(66) Room 7115

(67) 1305 East-West Highway

(68) Silver Spring, MD 20910-3281

(69) TEL 301-713-2815 Exts. 123, 119, 122 (voice)

(70) FAX 301-713-4500 (24 hours)

(71) EMAIL Tide.Predictions@noaa.gov

(72) Tidal observation data for some of the NOS tide stations and information about how to obtain other data is available on the Center for Operational Oceanographic Products and Services web site (**http://www.co-ops.nos.noaa.gov**). Tidal observation data is also available in hard copy by mail, and in some instances, by fax.

(73) Anyone with questions or comments regarding the above subject or private printers and distributors wishing more information should write, telephone, fax or e-mail to:

(74) National Ocean Service, NOAA

(75) Products and Services Division (N/OPS3)

(76) Center for Operational Oceanographic Products and Services

(77) Room 7317

(78) 1305 East-West Highway

(79) Silver Spring, MD 20910-3281

(80) TEL 301-713-2877 Exts. 176, 152

(81) FAX 301-713-4437 (24 hours)

(82) EMAIL Stephen.Lyles@noaa.gov

(83) NOS, in partnership with other agencies and institutions, has established a series of Physical Oceanographic Real Time Systems (PORTS®) in selected areas. These PORTS® sites provide constantly updated information on tidal and tidal current conditions, water temperature, and weather conditions. This information is updated every six minutes. The PORTS® sites currently in operation include: Tampa Bay, FL; San Francisco, CA; New York/New Jersey; Houston/Galveston, TX; Chesapeake Bay, VA, MD & DC; Narragansett Bay, RI; Los Angeles/Long Beach, CA; Soo Locks, MI and Delaware River/Bay, DE, NJ & PA. The information is accessible through a computer data connection or by a voice response system at the following numbers:

(84) **TAMPA BAY**

(85) Voice response 727-822-5836 or 727-822-0022

(86) Data 727-822-5931 (2400 baud, N-8-1)

(87) **SAN FRANCISCO**

(88) Voice response 707-642-4337

(89) Data 707-642-4608 (2400 baud, N-8-1)

(90) **NEW YORK/NEW JERSEY**

(91) Voice response 728-815-9668 or 9684

(92) **HOUSTON/GALVESTON**

(93) Voice response 713-673-1860 or 5371, 409-766-1031

(94) Data 713-672-9627 (9600 baud, N-8-1)

(95) **CHESAPEAKE BAY**

(96) Voice response 757-548-3051

(97) **NARRAGANSETT BAY**

(98) Voice response 401-849-8236 or 1-888-301-9983

(99) **LOS ANGELES/LONG BEACH**

(100) Voice response (Not available)

(101) **SOO LOCKS**

(102) Voice response (Not available)

(103) **DELAWARE RIVER/BAY**

(104) Voice response (Not available)

(105) Anyone with questions or comments regarding the above subject or wishing more information should write, telephone, or fax to:

(106) PORTS® Information and Data

(107) Products and Services Division (N/OPS3)

(108) Center for Operational Oceanographic Products and Services

(109) Room 7317

(110) 1305 East-West Highway

(111) Silver Spring, MD 20910-3281

(112) TEL 301-713-2877 Exts. 176, 149, 148

(113) FAX 301-713-4437 (24 hours)

(114) EMAIL Stephen.Lyles@noaa.gov

(115) Limited voice response systems for tidal information have been installed in Anchorage and Nikiski, Alaska. For information on these systems contact:

(116) Director
(117) Pacific Marine Center
(118) National Ocean Service
(119) 1801 Fairview Ave. East
(120) Seattle, WA 98102-3767
(121) TEL 206-553-2256
(122) FAX 206-553-2246
(123) **ANCHORAGE**
(124) Voice response 907-277-1903
(125) **NIKISKI**
(126) Voice response 907-776-5436

(127) **National Data Buoy Center Meteorological Buoys**.-The National Data Buoy Center (NDBC) deploys moored meteorological buoys which provide weather data directly to the mariner as well as to marine forecasters. Recently (reported January 1998), a disproportionate number of these buoys have had mooring failures due to abrasion of the nylon mooring line by trawls, tow lines, etc.

(128) These buoys have a watch circle radius (WCR) of 2,000 to 4,000 yards from assigned position (AP). In addition, any mooring in waters deeper than 1,000 feet will have a floating "loop" or catenary that may be as little as 500 feet below the surface. This catenary could be anywhere within the buoy's WCR. Any underwater activity within this radius may contact the mooring causing a failure.

(129) To estimate a buoy's WCR in yards, divide the charted depth (in feet) by three. For example, the WCR of a buoy moored at a charted depth of 12,000 feet can be estimated at 4,000 yards.

(130) To avoid cutting or damaging a moor, mariners are urged to exercise extreme caution when navigating in the vicinity of meteorological buoys and to remain well clear of the watch circle. If a mooring is accidentally contacted or cut, please notify NDBC at (228) 688-2835 or (228) 688-2436.

(131) For further information relating to these buoys consult the NDBC home page (**http://seaboard.ndbc.noaa.gov**).

(132) **Coast Guard,** Department of Transportation.–The Coast Guard has among its duties the enforcement of the laws of the United States on the high seas and in coastal and inland waters of the U.S. and its possessions; enforcement of navigation and neutrality laws and regulations; establishment and enforcement of navigational regulations upon the Inland Waters of the United States, including the establishment of a demarcation line separating the high seas from waters upon which U.S. navigational rules apply; administration of the Oil Pollution Act of 1961, as amended; establishment and administration of vessel anchorages; approval of bridge locations and clearances over navigable waters; administration of the alteration of obstructive bridges; regulation of drawbridge operations; inspection of vessels of the Merchant Marine; admeasurement of vessels; documentation of vessels; preparation and publication of merchant vessel registers; registration of stack insignia; port security; issuance of Merchant Marine licenses and documents; search and rescue operations; investigation of marine casualties and accidents, and suspension and revocation proceedings; destruction of derelicts; operation of aids to navigation; publication of Light Lists and Local Notices to Mariners; and operation of ice-breaking facilities.

(133) The Coast Guard, with the cooperation of coast radio stations of many nations, operates the **Automated Mutual-assistance Vessel Rescue System (AMVER).** It is an international maritime mutual assistance program which provides important aid to the development and coordination of search and rescue (SAR) efforts in many offshore areas of the world. Merchant ships of all nations making offshore passages are encouraged to voluntarily send movement (sailing) reports and periodic position reports to the AMVER Center at Coast Guard New York via selected radio stations. Information from these reports is entered into an electronic computer which generates and maintains dead reckoning positions for the vessels. Characteristics of vessels which are valuable for determining SAR capability are also entered into the computer from available sources of information.

(134) A worldwide communications network of radio stations supports the AMVER System. Propagation conditions, location of vessel, and traffic density will normally determine which station may best be contacted to establish communications. To ensure that no charge is applied, all AMVER reports should be passed through specified radio stations. Those stations which currently accept AMVER reports and apply no coastal station, ship station, or landline charge are listed in each issue of the "AMVER Bulletin" publication. Also listed are the respective International radio call signs, locations, frequency bands, and hours of operation. The "AMVER Bulletin" is available from AMVER Maritime Relations, U.S. Coast Guard, Battery Park Building, New York, NY 10004, TEL 212-668-7764, FAX 212-668-7684. Although AMVER reports may be sent through nonparticipating stations, the Coast Guard cannot reimburse the sender for any charges applied.

(135) Information concerning the predicted location and SAR characteristics of each vessel known to be within the area of interest is made available upon request to recognized SAR agencies of any nation or vessels needing assistance. Predicted locations are only disclosed for reasons related to marine safety.

(136) Benefits of AMVER participation to shipping include: (1) improved chances of aid in emergencies, (2) reduced number of calls for assistance to vessels not favorably located, and (3) reduced time lost for vessels responding to calls for assistance. An AMVER participant is under no greater obligation to render assistance during an emergency than a vessel who is not participating.

(137) All AMVER messages should be addressed to **Coast Guard New York** regardless of the station to which the message is delivered, except those sent to Canadian stations which should be addressed to **AMVER Halifax** or **AMVER Vancouver** to avoid incurring charges to the vessel for these messages.

(138) Instructions guiding participation in the AMVER System are available in the following languages: Chinese, Danish, Dutch, English, French, German, Greek, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Russian, Spanish, and Swedish. The AMVER Users Manual is available from: AMVER Maritime Relations, (address above); Commander, Atlantic Area, U.S. Coast Guard, Federal Building, 431 Crawford Street, Portsmouth, VA 23704-5004; Commander, Pacific Area, U.S. Coast Guard, Coast Guard Island, Alameda, CA. 94501-5100; and at U.S. Coast Guard District Offices, Marine Safety Offices, Marine Inspection Offices, and Captain of the Port Offices in major U.S. ports. Requests for instructions should state the language desired if other than English.

(139) For AMVER participants bound for U.S. ports there is an additional benefit. AMVER participation via messages which include the necessary information is considered to meet the

requirements of 33 CFR 160. (See **160.201,** chapter 2, for rules and regulations.)

(140) **AMVER Reporting Required.**–U.S. Maritime Administration regulations effective August 1, 1983, state that certain U.S. flag vessels and foreign flag "War Risk" vessels must report and regularly update their voyages to the AMVER Center. This reporting is required of the following: (a) U.S. flag vessels of 1,000 gross tons or greater, operating in foreign commerce; (b) foreign flag vessels of 1,000 gross tons or greater, for which an Interim War Risk Insurance Binder has been issued under the provisions of Title XII, Merchant Marine Act, 1936.

(141) Details of the above procedures are contained in the AMVER Users Manual. The system is also published in NIMA Pub. 117.

(142) Search and Rescue Operation procedures are contained in the International Maritime Organization (IMO) SAR Manual (MERSAR). U.S. flag vessels may obtain a copy of MERSAR from local Coast Guard Marine Safety Offices and Marine Inspection Offices or by writing to U.S. Coast Guard (G-OSR), Washington, D.C. 20593-0001. Other flag vessels may purchase MERSAR directly from IMO.

(143) The Coast Guard conducts and/or coordinates **search and rescue** operations for surface vessels and aircraft that are in distress or overdue. (See Distress Signals and Communication Procedures this chapter.)

(144) **Light Lists,** published by the Coast Guard, describe aids to navigation, consisting of lights, fog signals, buoys, lightships, daybeacons, and electronic aids, in United States (including Puerto Rico and U.S. Virgin Islands) and contiguous Canadian waters. Light Lists are for sale by the Government Printing Office (see appendix for address) and by sales agents in the principal seaports. Mariners should refer to these publications for detailed information regarding the characteristics and visibility of lights, and the descriptions of light structures, lightships, buoys, fog signals, and electronic aids. Light List corrections may be obtained from the Internet at (http://pollux.nss.nima.mil/pubs/USCGLL/pubs_j_uscgll_list.html).

(145) **Documentation** (issuance of certificates of registry, enrollments, and licenses), admeasurements of vessels, and administration of the various navigation laws pertaining thereto are functions of the Coast Guard. Yacht commissions are also issued, and certain undocumented vessels required to be numbered by the Federal Boat Safety Act of 1971 are numbered either by the Coast Guard or by a State having an approved numbering system (the latter is most common). Owners of vessels may obtain the necessary information from any Coast Guard District Commander, Marine Safety Office, or Marine Inspection Office. Coast Guard District Offices, Coast Guard Stations, Marine Safety Offices, Captain of the Port Offices, Marine Inspection Offices, and Documentation Offices are listed in the appendix. (Note: A Marine Safety Office performs the same functions as those of a Captain of the Port and a Marine Inspection Office. When a function is at a different address than the Marine Safety Office, it will be listed separately in the appendix.)

(146) **U.S. Army Corps of Engineers (USACE)**.–The U.S. Army Corps of Engineers has charge of the improvement of the rivers and harbors of the United States and of miscellaneous other civil works which include the administration of certain Federal laws enacted for the protection and preservation of navigable waters of the United States; the establishment of regulations for the use, administration, and navigation of navigable waters; the establishment of harbor lines; the removal of sunken vessels obstructing or endangering navigation; and the granting of permits for structures or operations in navigable waters, and for discharges and deposits of dredged and fill materials in these waters.

(147) **Restricted areas** in most places are defined and regulations governing them are established by the U.S. Army Corps of Engineers. The regulations are enforced by the authority designated in the regulations, and the areas are shown on the large-scale charts of NOS. Copies of the regulations may be obtained at the District offices of the U.S. Army Corps of Engineers. The regulations also are included in the appropriate Coast Pilot.

(148) Information concerning the various ports, improvements, channel depths, navigable waters, and the condition of the Intracoastal Waterways in the areas under their jurisdiction may be obtained direct from the District Engineer Offices. (See appendix for addresses.)

(149) **Fishtraps.**–The U.S. Army Corps of Engineers has general supervision of location, construction, and manner of maintenance of all traps, weirs, pounds, or other fishing structures in the navigable waters of the United States. Where State and/or local controls are sufficient to regulate these structures, including that they do not interfere with navigation, the U.S. Army Corps of Engineers leaves such regulation to the State or local authority. (See **33 CFR 330** (not carried in this Pilot) for applicable Federal regulations.) Construction permits issued by the Engineers specify the lights and signals required for the safety of navigation.

(150) **Fish havens,** artificial reefs constructed to attract fish, can be established in U.S. coastal waters only as authorized by a U.S. Army Corps of Engineers permit; the permit specifies the location, extent, and depth over these "underwater junk piles."

(151) **Environmental Protection Agency (EPA).**–The U.S. Environmental Protection Agency provides coordinated governmental action to assure the protection of the environment by abating and controlling pollution on a systematic basis. The ocean dumping permit program of the Environmental Protection Agency provides that except when authorized by permit, the dumping of any material into the ocean is prohibited by the "Marine Protection, Research, and Sanctuaries Act of 1972, Public Law 92–532," as amended (33 USC 1401 et seq.).

(152) Permits for the **dumping of dredged material** into waters of the United States, including the territorial sea, and into ocean waters are issued by the U.S. Army Corps of Engineers. Permits for the dumping of fill material into waters of the United States, including the territorial sea, are also issued by the U.S. Army Corps of Engineers. Permits for the dumping of other material in the territorial sea and ocean waters are issued by the Environmental Protection Agency.

(153) U.S. Army Corps of Engineers regulations relating to the above are contained in **33 CFR 323-324**; Environmental Protection Agency regulations are in **40 CFR 220-229**. (See Disposal Sites, this chapter.)

(154) Persons or organizations who want to file for an application for an ocean dumping permit should write the Environmental Protection Agency Regional Office for the region in which the port of departure is located. (See appendix for addresses of regional offices and States in the EPA coastal regions.)

(155) The letter should contain the name and address of the applicant; name and address of person or firm; the name and usual location of the conveyance to be used in the transportation and dumping of the material involved; a physical description where appropriate; and the quantity to be dumped and proposed dumping site.

(156) Everyone who writes EPA will be sent information about a final application for a permit as soon as possible. This final application is expected to include questions about the description of the process or activity giving rise to the production of the dumping material; information on past activities of applicant or others with respect to the disposal of the type of material involved; and a description about available alternative means of disposal of the material with explanations about why an alternative is thought by the applicant to be inappropriate.

(157) **Federal Communications Commission .**–The Federal Communications Commission controls non-Government radio communications in the United States, Guam, Puerto Rico, and the Virgin Islands. Commission inspectors have authority to board ships to determine whether their radio stations comply with international treaties, Federal Laws, and Commission regulations. The commission has field offices in the principal U.S. ports. (See appendix for addresses.) Information concerning ship radio regulations and service documents may be obtained from the Federal Communications Commission, Washington, D.C. 20554, or from any of the field offices.

(158) **Immigration and Naturalization Service,** Department of Justice.–The Immigration and Naturalization Service administers the laws relating to admission, exclusion, and deportation of aliens, the registration and fingerprinting of aliens, and the naturalization of aliens lawfully resident in the United States.

(159) The designated ports of entry for aliens are divided into three classes. Class A is for all aliens. Class B is only for aliens who at the time of applying for admission are lawfully in possession of valid resident aliens' border-crossing identification cards or valid nonresident aliens' border-crossing identification cards or are admissible without documents under the documentary waivers contained in **8 CFR 212.1(a)**. Class C is only for aliens who are arriving in the United States as crewmen as that term is defined in Section 101(a) (10) of the Immigration and Nationality Act. [The term "crewman" means a person serving in any capacity on board a vessel or aircraft. No person may enter the United States until he has been inspected by an immigration officer. A list of the offices covered by this Coast Pilot is given in the appendix.

(160) **National Imagery and Mapping Agency (NIMA),** Department of Defense.–The National Imagery and Mapping Agency provides hydrographic, navigational, topographic, and geodetic data, charts, maps, and related products and services to the Armed Forces, other Federal Agencies, the Merchant Marine and mariners in general. Publications include Sailing Directions, List of Lights, Distances Between Ports, Radio Navigational Aids, International Code of Signals, American Practical Navigator (Bowditch), and Notice to Mariners. (See National Imagery and Mapping Agency Procurement Information in appendix.)

(161) **Public Health Service,** Department of Health and Human Services.–The Public Health Service administers foreign quarantine procedures at U.S. ports of entry.

(162) All vessels arriving in the United States are subject to public health inspection. Vessels subject routine boarding for quarantine inspection are only those which have had on board during the 15 days preceding the date of expected arrival or during the period since departure (whichever period of time is shorter) the occurrence of any death or ill person among passengers or crew (including those who have disembarked or have been removed). The master of a vessel must report such occurrences immediately by radio to the quarantine station at or nearest the port at which the vessel will arrive.

(163) In addition, the master of a vessel carrying 13 or more passengers must report by radio 24 hours before arrival the number of cases (including zero) of diarrhea in passengers and crew recorded in the ship's medical log during the current cruise. All cases that occur after the 24 hour report must also be reported not less than 4 hours before arrival.

(164) "Ill person" means person who:

(165) 1. Has a temperature of 100°F (or 38°C) or greater, accompanied by a rash, glandular swelling, or jaundice, or which has persisted for more than 48 hours; or

(166) 2. Has diarrhea, defined as the occurrence in a 24 hour period of three or more loose stools or of a greater than normal (for the person) amount of loose stools.

(167) Vessels arriving at ports under control of the United States are subject to sanitary inspection to determine whether measures should be applied to prevent the introduction, transmission, or spread of communicable disease.

(168) Specific public health laws, regulations, policies, and procedures may be obtained by contacting U.S. Quarantine Stations, U.S. Consulates or the Chief Program Operations, Division of Quarantine, Centers for Disease Control and Prevention, Atlanta, Ga. 30333. (See appendix for addresses of U.S. Public Health Service Quarantine Stations.)

(169) **Food and Drug Administration (FDA),** Public Health Service, Department of Health and Human Services.–Under the provisions of the Control of Communicable Diseases Regulations (**21 CFR 1240**) and Interstate Conveyance Sanitation Regulations (**21 CFR 1250**), vessel companies operating in interstate traffic shall obtain potable water for drinking and culinary purposes only at watering points found acceptable to the Food and Drug Administration. Water supplies used in watering point operations must also be inspected to determine compliance with applicable Interstate Quarantine Regulations (**42 CFR 72**). These regulations are based on authority contained in the Public Health Service Act (PL 78–410). Penalties for violation of any regulation prescribed under authority of the Act are provided for under Section 368 (42 USC 271) of the Act.

(170) **Vessel Watering Points.**–FDA annually publishes a list of Acceptable Vessel Watering Points. This list is available from most FDA offices or from Interstate Travel Sanitation Subprogram Center for Food Safety and Applied Nutrition, FDA (HFF-312), 200 C Street SW., Washington, D.C. 20204. Current status of watering points can be ascertained by contacting any FDA office. (See appendix for addresses.)

(171) **National Weather Service** (NWS), National Oceanic and Atmospheric Administration (NOAA), Department of Com-

merce.–The National Weather Service provides marine weather forecasts and warnings for the U.S. coastal waters, the Great Lakes, offshore waters, and high seas areas. Scheduled marine forecasts are issued four times daily from more than 20 **National Weather Service Forecast Offices (WSFOs)** around the country, operating 24 hours a day. Marine services are also provided by over 50 **National Weather Service Offices** with local areas of responsibility. (See appendix for Weather Service Forecast Offices and Weather Service Offices for the area covered by this Coast Pilot.)

(172) Typically, the forecasts contain information on wind speed and direction, wave heights, visibility, weather, and a general synopsis of weather patterns affecting the region. The forecasts are supplemented with special marine warnings and statements, radar summaries, marine observations, small-craft advisories, gale warnings, storm warnings and various categories of tropical cyclone warnings e.g., tropical depression, tropical storm and hurricane warnings. Specialized products such as coastal flood, seiche, and tsunami warnings, heavy surf advisories, low water statements, ice forecasts and outlooks, and lake shore warnings and statements are issued as necessary.

(173) The principal means of disseminating marine weather services and products in coastal areas is **NOAA Weather Radio.** This network or more than 350 stations nationwide is operated by the NWS and provides continuous broadcasts of weather information for the general public. These broadcasts repeat taped messages every 4-6 minutes. Tapes are updated periodically, usually every 2-3 hours and amended as required to include the latest information. When severe weather threatens, routine transmissions are interrupted and the broadcast is devoted to emergency warnings. (See appendix for NOAA Weather Radio Stations covered by this Coast Pilot.)

(174) In coastal areas, the programming is tailored to the needs of the marine community. Each coastal marine forecast covers a specific area. For example, "Cape Henlopen to Virginia Beach, out 20 miles." The broadcast range is about 40 miles from the transmitting antenna site, depending on terrain and quality of the receiver used. When transmitting antennas are on high ground, the range is somewhat greater, reaching 60 miles or more. Some receivers are equipped with a warning alert device that can be turned on by means of a tone signal controlled by the NWS office concerned. This signal is transmitted for 13 seconds preceding an announcement of a severe weather warning.

(175) NWS marine weather products are also disseminated to marine users through the broadcast facilities of the Coast Guard, Navy, and commercial marine radio stations. Details on these broadcasts including times, frequencies, and broadcast content are listed in the joint NWS/Navy publication Selected Worldwide Marine Weather Broadcasts. For marine weather services in the coastal areas, the NWS publishes a series of Marine Weather Services Charts showing locations of NOAA Weather Radio stations, sites, telephone numbers of recorded weather messages and NWS offices, and other useful marine weather information.

(176) Ships of all nations share equally in the effort to report weather observations. These reports enable meteorologists to create a detailed picture of wind, wave, and weather patterns over the open waters that no other data source can provide and upon which marine forecasts are based. The effectiveness and reliability of these forecasts and warnings plus other services to the marine community are strongly linked to the observations received from mariners. There is an especially urgent need for ship observations in the coastal waters, and the NWS asks that these be made and transmitted whenever possible. Many storms originate and intensify in coastal areas. There may be a great difference in both wind direction and speed between the open sea, the offshore waters, and on the coast itself.

(177) Information on how ships, commercial fishermen, offshore industries, and others in the coastal zone may participate in the marine observation program is available from **National Weather Service Port Meteorological Officers (PMOs).** Port Meteorological Officers are located in major U.S. port cities and the Republic of Panama, where they visit ships in port to assist masters and mates with the weather observation program, provide instruction on the interpretation of weather charts, calibrate barometers and other meteorological instruments, and discuss marine weather communications and marine weather requirements affecting the ships' operations. (See appendix for addresses of Port Meteorological Officers in or near the area covered by this Coast Pilot.)

(178) **National Environmental Satellite, Data, and Information Service** (NESDIS), National Oceanic and Atmospheric Administration (NOAA), Department of Commerce.–Among its functions, NESDIS archives, processes, and disseminates the non-realtime meteorological and oceanographic data collected by government agencies and private institutions. Marine weather observations are collected from ships at sea on a voluntary basis. About 1 million observations are received annually at NESDIS's National Climatic Center. They come from vessels representing every maritime nation. These observations, along with land data, are returned to the mariners in the form of climatological summaries and atlases for coastal and ocean areas. They are available in such NOAA publications as the **U.S. Coast Pilot, Mariners Weather Log,** and **Local Climatological Data, Annual Summary.** They also appear in the National Imagery and Mapping Agency's **Pilot Chart Atlases** and **Sailing Directions Planning Guides.**

## DISTRESS SIGNALS AND COMMUNICATION PROCEDURES

(179) **Coast Guard search and rescue operations.**–The Coast Guard conducts and/or coordinates search and rescue operations for surface vessels or aircraft that are in distress or overdue. Search and Rescue vessels and aircraft have special markings, including a wide slash of red-orange and a small slash of blue on the forward portion of the hull or fuselage. Other parts of aircraft, normally painted white, may have other areas painted red to facilitate observation. The cooperation of vessel operators with Coast Guard helicopters, fixed-wing aircraft, and vessels may mean the difference between life and death for some seaman or aviator; such cooperation is greatly facilitated by the prior knowledge on the part of vessel operators of the operational requirements of Coast Guard equipment and personnel, of the international distress signals and procedures, and of good seamanship.

(180) **Note.**–In August 1993, all Coast Guard communication stations and cutters discontinued watchkeeping on the distress frequency 500 kHz. Distress and other calls to Coast Guard communication stations may be made on any of the following HF single sideband radiotelephone channels: 424(4134 kHz), 601(6200 kHz), 816(8240 kHz), or 1205(12242 kHz).

Ver. 1.0 This information is not certified for navigation purposes. For test purposes only.

(181) **International distress signals.**–(1) A signal made by radiotelegraphy or by any other signaling method consisting of the group "SOS" in Morse Code.

(182) (2) A signal sent by radiotelephony consisting of the spoken word "MAYDAY."

(183) (3) The International Flag Code Signal of NC.

(184) (4) A signal consisting of a square flag having above or below it a ball or anything resembling a ball.

(185) (5) Flames on the craft (as from a burning oil barrel, etc.)

(186) (6) A rocket parachute flare or hand flare showing a red light.

(187) (7) Rockets or shells, throwing red stars fired one at a time at short intervals.

(188) (8) Orange smoke, as emitted from a distress flare.

(189) (9) Slowly and repeatedly raising and lowering arms outstretched to each side.

(190) (10) A gun or other explosive signal fired at intervals of about 1 minute.

(191) (11) A continuous sounding of any fog-signal apparatus.

(192) (12) The radiotelegraph alarm signal.

(193) (13) The radiotelephone alarm signal.

(194) (14) Signals transmitted by emergency position-indicating radiobeacons.

(195) (15) A piece of orange-colored canvas with either a black square and circle or other appropriate symbol (for identification from the air).

(196) (16) A dye marker.

(197) **Radio distress procedures.**–Distress calls are made on 2182 kHz or VHF-FM channel 16 (MAYDAY). For less serious situations than warrant the distress procedure, the urgency signal PAN-PAN (PAHN-PAHN, spoken three times), or the safety signal SECURITY (SAY-CURITAY, spoken three times), for radiotelephony, are used as appropriate. Since radiotelegraph transmissions are normally made by professional operators, and urgency and safety situations are less critical, only the distress procedures for voice radiotelephone are described. For complete information on emergency radio procedures, see **47 CFR 83** or NIMA Pub. 117. **(See appendix for a list of Coast Guard Stations which guard 2182 kHz and 156.80 MHz.)** Complete information on distress guards can be obtained from Coast Guard District Commanders.

(198) Distress calls indicate a vessel or aircraft is threatened by grave and imminent danger and requests immediate assistance. They have absolute priority over all other transmissions. All stations which hear a distress call must immediately cease any transmission capable of interfering with the distress traffic and shall continue to listen on the frequency used for the emission of the distress call. This call shall not be addressed to a particular station, and acknowledgment of receipt shall not be given before the distress message which follows it is sent.

(199) **Radiotelephone distress communications include the following actions:**

(200) (1) The **radiotelephone alarm signal** (if available): The signal consists of two audio tones, of different pitch, transmitted alternately; its purpose is to attract the attention of persons on radio watch or to actuate automatic alarm devices. It may only be used to announce that a distress call or message is about to follow.

(201) (2) The **distress call,** consisting of:–the distress signal MAYDAY (spoken three times);

(202) the words THIS IS (spoken once);

(203) the call sign or name of the vessel in distress (spoken three times).

(204) (3) The **distress message** follows immediately and consists of:

(205) the distress signal MAYDAY;

(206) the call sign and name of the vessel in distress;

(207) particulars of its position (latitude and longitude, or true bearing and distance from a known geographical position);

(208) the nature of the distress;

(209) the kind of assistance desired;

(210) the number of persons aboard and the condition of any injured;

(211) present seaworthiness of vessel;

(212) description of the vessel (length; type; cabin; masts; power; color of hull, superstructure, trim; etc.);

(213) any other information which might facilitate the rescue, such as display of a surface-to-air identification signal or a radar reflector;

(214) your listening frequency and schedule;

(215) THIS IS (call sign and name of vessel in distress). OVER.

(216) (4) **Acknowledgment of receipt of a distress message:** If a distress message is received from a vessel which is definitely in your vicinity, immediately acknowledge receipt. If it is not in your vicinity, allow a short interval of time to elapse before acknowledging, in order to permit vessels nearer to the vessel in distress to acknowledge receipt without interference. However, in areas where reliable communications with one or more shore stations are practicable, all vessels may defer this acknowledgment for a short interval so that a shore station may acknowledge receipt first. The acknowledgment of receipt of a distress is given as follows:

(217) the call sign or name of the vessel sending the distress (spoken three times);

(218) the words THIS IS;

(219) the call sign or name of acknowledging vessel (spoken three times);

(220) The words RECEIVED MAYDAY.

(221) After the above acknowledgment, allow a momentary interval of listening to insure that you will not interfere with another vessel better situated to render immediate assistance; if not, with the authority of the person in charge of the vessel, transmit:

(222) the word MAYDAY;

(223) the call sign and name of distressed vessel;

(224) the words THIS IS;

(225) the call sign and name of your vessel;

(226) your position (latitude and longitude, or true bearing and distance from a known geographical position);

(227) the speed you are proceeding towards, and the approximate time it will take to reach, the distressed vessel. OVER.

(228) (5) **Further distress messages and other communications:** Distress communications consist of all messages relating to the immediate assistance required by the distressed vessel. Each distress communication shall be preceded by the signal MAYDAY. The vessel in distress or the station in control of distress communications may **impose silence** on any station which interferes. The procedure is:–the words SEELONCE MAYDAY (Seelonce is French for silence). Silence also may be imposed by nearby mobile stations other than the vessel in distress or the station in control of distress communications. The mobile station which believes that silence is essential may request silence by the

following procedure:–the word SEELONCE, followed by the word DISTRESS, and its **own** call sign.

(229) (6) **Transmission of the distress procedure by a vessel or shore station not itself in distress:** A vessel or a shore station which learns that a vessel is in distress shall transmit a distress message in any of the following cases:

(230) (a) **When the vessel in distress is not itself able to transmit the distress message.**

(231) (b) When a vessel or a shore station considers that further help is necessary.

(232) (c) When, although not in a position to render assistance, it has heard a distress message that has not been acknowledged.

(233) In these cases, the transmission shall consist of:

(234) the radiotelephone alarm signal (if available);

(235) the words MAYDAY RELAY (spoken three times);

(236) the words THIS IS;

(237) the call sign and name of vessel (or shore station), spoken three times.

(238) When a vessel transmits a distress under these conditions, it shall take all necessary steps to contact the Coast Guard or a shore station which can notify the Coast Guard.

(239) (7) **Termination of distress:** When distress traffic has ceased, or when silence is no longer necessary on the frequency used for the distress traffic, the station in control shall transmit on that frequency a message to all stations as follows:

(240) the distress signal MAYDAY;

(241) the call TO ALL STATIONS, spoken three times;

(242) the words THIS IS;

(243) the call sign and name of the station sending the message;

(244) the time;

(245) the name and call sign of the vessel in distress;

(246) the words SEELONCE FEENEE (French for silence finished).

## DISTRESS ASSISTANCE AND COORDINATION PROCEDURES

(247) **Surface ship procedures for assisting distressed surface vessels.**

(248) (1) The following immediate action should be taken by each ship on receipt of a distress message:

(249) (a) Acknowledge receipt and, if appropriate, retransmit the distress message;

(250) (b) Immediately try to take D/F bearings during the transmission of the distress message and maintain a D/F watch on 2182 kHz;

(251) (c) Communicate the following information to the ship in distress:

(252) (i) identity;

(253) (ii) position;

(254) (iii) speed and estimated time of arrival (ETA);

(255) (iv) when available, true bearing of the ship in distress.

(256) (d) Maintain a continuous listening watch on the frequency used for the distress. This will normally be:

(257) (i) 2182 kHz (radiotelephone).

(258) (e) Additionally, maintain watch on VHF-FM channel 16 as necessary;

(259) (f) Operate radar continuously;

(260) (g) If in the vicinity of the distress, post extra lookouts.

(261) (2) The following action should be taken when proceeding to the area of distress:

(262) (a) Plot the position, course, speed, and ETA of other assisting ships.

(263) (b) Know the communication equipment with which other ships are fitted. This information may be obtained from the International Telecommunication Union's List of Ship Stations.

(264) (c) Attempt to construct an accurate "picture" of the circumstances attending the casualty. The important information needed is included under Distress Signals and Communication Procedures, this chapter. Should the ship in distress fail to transmit this information, a ship proceeding to assist should request what information is needed.

(265) (3) The following on-board preparation while proceeding to the distress area should be considered:

(266) (a) A rope (guest warp) running from bow to quarter at the waterline on each side and secured by lizards to the ship's side to assist boats and rafts to secure alongside;

(267) (b) A derrick rigged ready for hoisting on each side of the ship with a platform cargo sling, or rope net, secured to the runner to assist the speedy recovery of exhausted or injured survivors in the water;

(268) (c) Heaving lines, ladders, and scramble net placed ready for use along both sides of the ship on the lowest open deck and possibly crew members suitably equipped to enter the water and assist survivors;

(269) (d) A ship's liferaft made ready for possible use as a boarding station;

(270) (e) Preparations to receive survivors who require medical assistance including the provision of stretchers;

(271) (f) When own lifeboat is to be launched, any means to provide communications between it and the parent ship will prove to be of very great help;

(272) (g) A line throwing appliance with a light line and a heavy rope, ready to be used for making connection either with the ship in distress or with survival craft.

(273) **Aircraft procedures for directing surface craft to scene of distress incident.**–The following procedures performed in sequence by an aircraft mean that the aircraft is directing a surface craft toward the scene of a distress incident,

(274) (a) Circling the surface craft at least once.

(275) (b) Crossing the projected course of the surface craft close ahead at low altitude, rocking the wings, opening and closing the throttle, or changing the propeller pitch.

(276) (c) Heading in the direction in which the surface craft is to be directed. The surface craft should acknowledge the signal by changing course and following the aircraft. If, for any reason, it is impossible to follow, the surface craft should hoist the international code flag NOVEMBER, or use any other signaling means available to indicate this.

(277) The following procedures performed by an aircraft mean that the assistance of the surface craft is no longer required:

(278) (a) Crossing the wake of the surface craft close astern at a low altitude, rocking the wings, opening and closing the throttle or changing the propeller pitch.

(279) Since modern jet-engined aircraft cannot make the characteristic sound associated with opening and closing the throttle, or changing propeller pitch, ships should be alert to respond to the signals without the sounds, when jets or turboprop aircraft are involved.

(280) **Surface ship procedures for assisting aircraft in distress.**

(281) 1. When an aircraft transmits a distress message by radio, the first transmission is generally made on the designated air/ground enroute frequency in use at the time between the aircraft and aeronautical station. The aircraft may change to another frequency, possibly another enroute frequency or the aeronautical emergency frequencies of 121.50 MHz or 243 MHz. In an emergency, it may use any other available frequency to establish contact with any land, mobile, or direction-finding station.

(282) 2. There is liaison between Coast Radio Stations aeronautical units, and land–based search and rescue organizations. Merchant ships will ordinarily be informed of aircraft casualties at sea by broadcast messages from Coast Radio Stations, made on the international distress frequency of 2182 kHz. Ships may, however, become aware of the casualty by receiving:

(283) (a) An SOS message from an aircraft in distress which is able to transmit on radiotelephone on 2182 kHz.

(284) (b) A message from a SAR aircraft.

(285) 3. For the purpose of emergency communications with aircraft, special attention is called to the possibility of conducting direct communications on 2182 kHz, if both ship and aircraft are so equipped.

(286) 4. An aircraft in distress will use any means at its disposal to attract attention, make known its position, and obtain help, including some of the signals prescribed by the applicable Navigation Rules.

(287) 5. Aircraft usually sink quickly (e.g. within a few minutes). Every endeavor will be made to give ships an accurate position of an aircraft which desires to ditch. When given such a position, a ship should at once consult any other ships in the vicinity on the best procedure to be adopted. The ship going to the rescue should answer the station sending the broadcast and give her identity, position, and intended action.

(288) 6. If a ship should receive a distress message direct from an aircraft, she should act as indicated in the immediately preceding paragraph and also relay the message to the nearest Coast Radio Station. Moreover, a ship which has received a distress message direct from an aircraft and is going to the rescue should take a bearing on the transmission and inform the Coast Radio Station and other ships in the vicinity of the call sign of the distressed aircraft and the time at which the distress message was received, followed by the bearing and time at which the signal ceased.

(289) 7. When an aircraft decides to ditch in the vicinity of a ship, the ship should:

(290) (a) Transmit homing bearings to the aircraft, or (if so required) transmit signals enabling the aircraft to take its own bearings.

(291) (b) By day, make black smoke.

(292) (c) By night, direct a searchlight vertically and turn on all deck lights. Care must be taken not to direct a searchlight toward the aircraft, which might dazzle the pilot.

(293) 8. Ditching an aircraft is difficult and dangerous. A ship which knows that an aircraft intends to ditch should be prepared to give the pilot the following information:

(294) (a) Wind direction and force.

(295) (b) Direction, height, and length of primary and secondary swell systems.

(296) (c) Other pertinent weather information.

(297) The pilot of an aircraft will choose his own ditching heading. If this is known by the ship, she should set course parallel to the ditching heading. Otherwise the ship should set course parallel to the main swell system and into the wind component, if any.

(298) 9. A land plane may break up immediately on striking the water, and liferafts may be damaged. The ship should, therefore, have a lifeboat ready for launching, and if possible, boarding nets should be lowered from the ship and heaving lines made ready in the ship and the lifeboat. Survivors of the aircraft may have bright colored lifejackets and location aids.

(299) 10. The method of recovering survivors must be left to the judgment of the master of the ship carrying out the rescue operation.

(300) 11. It should be borne in mind that military aircraft are often fitted with ejection seat mechanisms. Normally, their aircrew will use their ejection seats, rather than ditch. Should such an aircraft ditch, rather than the aircrew bail out, and it becomes necessary to remove them from their ejection seats while still in the aircraft, care should be taken to avoid triggering off the seat mechanisms. The activating handles are invariably indicated by red and or black/yellow coloring.

(301) 12. A survivor from an aircraft casualty who is recovered may be able to give information which will assist in the rescue of other survivors. Masters are therefore asked to put the following questions to survivors and to communicate the answers to a Coast Radio Station. They should also give the position of the rescuing ship and the time when the survivors were recovered.

(302) (a) What was the time and date of the casualty?

(303) (b) Did you bail out or was the aircraft ditched?

(304) (c) If you bailed out, at what altitude?

(305) (d) How many others did you see leave the aircraft by parachute?

(306) (e) How many ditched with the aircraft?

(307) (f) How many did you see leave the aircraft after ditching?

(308) (g) How many survivors did you see in the water?

(309) (h) What flotation gear had they?

(310) (I) What was the total number of persons aboard the aircraft prior to the accident?

(311) (j) What caused the emergency?

(312) **Helicopter evacuation** of personnel.–Helicopter evacuation, usually performed by the Coast Guard, is a hazardous operation to the patient and to the flight crew, and should only be attempted in event of very serious illness or injury. Provide the doctor on shore with all the information you can concerning the patient, so that an intelligent evaluation can be made concerning the need for evacuation. Most rescue helicopters can proceed less than 150 miles offshore (a few new helicopters can travel 250 to 300 miles out to sea), dependent on weather conditions and other variables. If an evaluation is necessary, the vessel must be prepared to proceed within range of the helicopter, and should be familiar with the preparations which are necessary prior to and after its arrival.

(313) **When requesting helicopter assistance:**

(314) (1) Give the accurate position, time, speed, course, weather conditions, sea conditions, wind direction and velocity, type of vessel, and voice and CW frequency for your ship.

(315) (2) If not already provided, give complete medical information including whether or not the patient is ambulatory.

(316) (3) If you are beyond helicopter range, advise your diversion intentions so that a rendezvous point may be selected.

(317) (4) If there are changes to any items reported earlier, advise the rescue agency immediately. Should the patient die before the arrival of the helicopter, be sure to advise those assisting you.

(318) **Preparations prior to the arrival of the helicopter:**

(319) (1) Provide continuous radio guard on 2182 kHz or specified voice frequency, if possible. The helicopter normally cannot operate CW.

(320) (2) Select and clear the most suitable hoist area, preferably aft on the vessel with a minimum of 50 feet (15.2 meters) radius of clear deck. This must include the securing of loose gear, awnings, and antenna wires. Trice up running rigging and booms. If hoist is aft, lower the flag staff.

(321) (3) If the hoist is to take place at night, light the pickup areas as well as possible. Be sure you do not shine any lights on the helicopter, so that the pilot is not blinded. If there are any obstructions in the vicinity, put a light on them so the pilot will be aware of their positions.

(322) (4) Point searchlight vertically to aid the flight crew in locating the ship and turn them off when the helicopter is on the scene.

(323) (5) Be sure to advise the helicopter of the location of the pickup area on the ship before the helicopter arrives, so that the pilot may make his approach to aft, amidships, or forward, as required.

(324) (6) There will be a high noise level under the helicopter, so voice communications on deck are almost impossible. Arrange a set of hand signals among the crew who will assist.

(325) **Hoist operations:**

(326) (1) If possible, have the patient moved to a position as close to the hoist area as his condition will permit–**time is important.**

(327) (2) Normally, if a litter (stretcher) is required, it will be necessary to move the patient to the special litter which will be lowered by the helicopter. Be prepared to do this as quickly as possible. Be sure the patient is strapped in, face up, and with a life jacket on (if his condition will permit).

(328) (3) Be sure that the patient is tagged to indicate what medication, if any, was administered to him and when it was administered.

(329) (4) Have patient's medical record and necessary papers in an envelope or package ready for transfer with the patient.

(330) (5) Again, if the patient's condition permit, be sure he is wearing a life jacket.

(331) (6) Change the vessel's course to permit the ship to ride as easily as possible with the wind on the bow, preferably on the port bow. Try to choose a course to keep the stack gases clear of the hoist area. Once established, maintain course and speed.

(332) (7) Reduce speed to ease ship's motion, but maintain steerageway.

(333) (8) If you do not have radio contact with the helicopter, when you are in all respects ready for the hoist, signal the helicopter in with a "come on" with your hand, or at night by flashlight signals.

(334) (9) **Allow basket or stretcher to touch deck prior to handling to avoid static shock.**

(335) (10) If a trail line is dropped by the helicopter, guide the basket or stretcher to the deck with the line; keep the line free at all times. This line will not cause shock.

(336) (11) Place the patient in basket, sitting with his hands clear of the sides, or in the litter, as described above. Signal the helicopter hoist operator when ready for the hoist. Patient should signal by a nodding of the head if he is able. Deck personnel give thumbs up.

(337) (12) If it is necessary to take the litter away from the hoist point, unhook the hoist cable and keep it free for the helicopter to haul in. **Do not secure cable or trail line to the vessel or attempt to move stretcher without unhooking.**

(338) (13) When patient is strapped into the stretcher, signal the helicopter to lower the cable, attach cable to stretcher sling (bridle), then signal the hoist operator when the patient is ready to hoist. Steady the stretcher so it will not swing or turn.

(339) (14) If a trail line is attached to the basket or stretcher, use it to steady the patient as he is hoisted. Keep your feet clear of the line, and keep the line from becoming entangled.

(340) **Medical advice and/or evacuation.**–In the event a master of a vessel requires medical advice and/or there is a potential of evacuation the following should be volunteered by the master:

(341) Vessel's name and call sign.

(342) Vessel's position and time at position.

(343) Vessel's course, speed and next port and estimated time of arrival (ETA).

(344) Patient's name, nationality, age, race and sex.

(345) Patient's respiration, pulse and temperature.

(346) Patient's symptoms and nature of illness.

(347) Any known history of similar illness.

(348) Location and type of pain.

(349) Medical supplies carried on board vessel.

(350) Medication given to patient.

(351) Weather.

(352) Communication schedule and frequency.

(353) **Coast Guard droppable, floatable pumps.**–The Coast Guard often provides vessels in distress with emergency pumps by either making parachute drops, by lowering on helicopter hoist, or by delivering by vessel. The most commonly used type of pump comes complete in a sealed aluminum drum about half the size of a 50-gallon oil drum. One single lever on top opens it up. Don't be smoking as there may be gas fumes inside the can. The pump will draw about 90 gallons per minute. There should be a waterproof flashlight on top of the pump for night use. Operating instructions are provided inside the pump container.

(354) **Preparations for being towed by Coast Guard:**

(355) (1) Clear the forecastle area as well as you can.

(356) (2) If a line-throwing gun is used, keep everyone out of the way until line clears the boat. The Coast Guard vessel will blow a police whistle or otherwise warn you before firing.

(357) (3) Have material ready for chafing gear.

(358) **Radar reflectors on small craft.**–Operators of disabled wooden craft and persons adrift in rubber rafts or boats that are, or may consider themselves to be, the object of a search, should hoist on a halyard or otherwise place aloft as high as possible any metallic object that would assist their detection by radar. Coast Guard cutters and aircraft are radar equipped and thus are able to continue searching in darkness and during other periods of low visibility. It is advisable for coastal fishing boats, yachts, and other small craft to have efficient radar reflectors permanently installed aboard the vessel.

(359) **Filing Cruising schedules.**–Small-craft operators should prepare a cruising plan before starting on extended trips and leave it ashore with a yacht club, marina, friend, or relative. It is advisable to use a checking-in procedure by telephone for each point specified in the cruising plan. Such a trip schedule is vital for determining if a boat is overdue and will assist materially in locating a missing craft in the event search and rescue operations become necessary.

(360) **Medical advice.**–Free medical advice is furnished to seamen by radio through the cooperation of Governmental and commercial radio stations whose operators receive and relay messages prefixed **RADIOMEDICAL** from ships at sea to the U.S. Coast Guard and/or directly to a hospital and then radio the medical advice back to the ships. (See appendix for list of radio stations that provide this service.)

## RADIO NAVIGATION WARNINGS AND WEATHER

(361) Marine radio warnings and weather are disseminated by many sources and through several types of transmissions. U.S. Coast Guard NAVTEX, high-frequency (HF) narrow-band direct printing (radio telex), HF radiofacsimile, and radiotelephone broadcasts of maritime safety information are summarized here. (For complete information on radio warnings and weather see NIMA Pub. 117 and the NWS internet site, **Marine Product Dissemination Information Homepage**, (http://www.nws.noaa.gov/om/marine/home.htm).

(362) **Frequency units.–Hertz (Hz)**, a unit equal to one cycle per second, has been generally adopted for radio frequencies; accordingly, frequencies formerly given in the Coast Pilot in kilocycles (kc) and megacycles (mc) are now stated in **kilohertz (kHz)** and **Megahertz (MHz),** respectively.

(363) **Coast Guard radio stations.**–Coast Guard radio stations provide urgent, safety, and scheduled marine information broadcasts with virtually complete coverage of the approaches and coastal waters of the United States, Puerto Rico, and the U.S. Virgin Islands.

(364) **Urgent and safety radiotelephone broadcasts** of important Notice to Mariners items, storm warnings, and other vital marine information are transmitted upon receipt, and urgent broadcasts are repeated 15 minutes later; additional broadcasts are made at the discretion of the originator. **Urgent** broadcasts are preceded by the urgent signal PAN-PAN (PAHN-PAHN, spoken three times). **Both the urgent signal and message are transmitted on 2182 kHz and/or VHF-FM channel 16. Safety** broadcasts are preceded by the safety signal SECURITY (SAY-CURITAY, spoken three times). **The Safety signal is given on 2182 kHz and/or VHF-FM channel 16, and the message is given on 2670 kHz and/or VHF-FM channel 22A.**

(365) Scheduled radiotelephone broadcasts include routine weather, small-craft advisories, storm warnings, navigational information, and other advisories. Short-range broadcasts are made on **2670 kHz** and/or **VHF-FM channel 22A,** following a preliminary call on **2182 kHz** and/or **VHF-FM channel 16.** (See appendix for a list of stations and their broadcast frequencies and times for the area covered by this Coast Pilot.)

(366) Weather information is not normally broadcast by the Coast Guard on VHF-FM channel 22A in areas where NOAA Weather Radio service is available. See note below regarding VHF-FM channel 22A.

(367) HF single-sideband broadcasts of high seas weather information is available on the (carrier) frequencies 4428.7, 6506.4, 8765.4, 13113.2, and 17307.3 kHz from Portsmouth, VA and San Francisco, CA.

(368) Narrow-band direct printing (radio telex or sitor) broadcasts of NAVAREA and other navigational warnings are transmitted on the following assigned frequencies:

(369) Atlantic ice reports: 5320, 8502, and 12750 kHz.

(370) Other Atlantic warnings: 8490, 16968.8 kHz.

(371) Pacific: 8710.5, 8714.5, 8718, 13077, 13084.5, 17203, 22567, and 22574.5 kHz.

(372) HF radiofacsimile broadcasts of weather and ice charts are made on the following frequencies:

(373) Atlantic: 3242, 7530, 8502 (ice only), 12750 (ice only) kHz.

(374) Pacific: 4298 (Kodiak), 4336, 8459 (Kodiak), 8682, 12730, 17151.2 kHz.

(375) **Warning Regarding Coast Guard VHF-FM Channel 22A Broadcasts**.–The Coast Guard broadcasts urgent and routine maritime safety information to ships on channel 22A (157.10 MHz), the ship station transmit frequency portion of channel 22, of Appendix 18 of the International Telecommunications Union (ITU) Radio Regulations. This simplex use of channel 22A is not compatible with the international duplex arrangement of the channel (coast transmit 161.70 MHz, ship transmit 157.10 MHz). As a result, many foreign flag vessels having radios tuned to the international channel 22 can not receive these maritime safety broadcasts. A 1987 Coast Guard survey of foreign vessels in U.S. waters indicated that half of foreign vessels in U.S. waters did not have equipment on board capable of receiving channel 22A broadcasts.

(376) Operators of vessels which transit U.S. waters and who do not have VHF-FM radios tunable to USA channel 22A are urged to either obtain the necessary equipment, to monitor the radiotelephone frequency 2182 kHz and tune to 2670 kHz when a broadcast is announced, or to carry a NAVTEX receiver.

(377) **NAVTEX.–**NAVTEX is a maritime radio warning system consisting of a series of coast stations transmitting radio teletype (CCIR Recommendation 476 standard narrow band direct printing, sometimes called Sitor or ARQ/FEC) safety messages on the international standard medium frequency 518 kHz. Coast stations transmit during preset time slots so as to minimize interference with one another. Routine messages are normally broadcast four to six times daily. Urgent messages are broadcast upon receipt, provided that an adjacent station is not transmitting. Since the broadcast uses the medium frequency band, a typical station service radius ranges from 100-500 NM day and night. Interference from or receipt of stations farther away occasionally occurs at night.

(378) Each NAVTEX message broadcast contains a four-character header describing identification of station (first character), message content (second character), and message serial number (third and fourth characters). This header allows the microprocessor in the shipborne receiver to screen messages, selecting only those stations relevant to the user, messages of subject categories needed by the user, and messages not previously received by the user. Selected messages are printed on a roll of paper as received, to be read by the mariner at his convenience. Unwanted messages are suppressed. Suppression of unwanted messages is more and more important to the mariner as the number of messages, including rebroadcasts, increases yearly. With NAVTEX, a mariner will no longer find it necessary to listen to, or sift through, a large number of irrelevant data to obtain the information necessary for safe navigation.

(379) Vessels regulated by the Safety of Life at Sea (SOLAS) Convention, as amended in 1988 (cargo vessels over 300 tons and passenger vessels, on international voyages), and operating in areas where NAVTEX service is available, have been required to carry NAVTEX receivers since 1 August 1993. The USCG dis-

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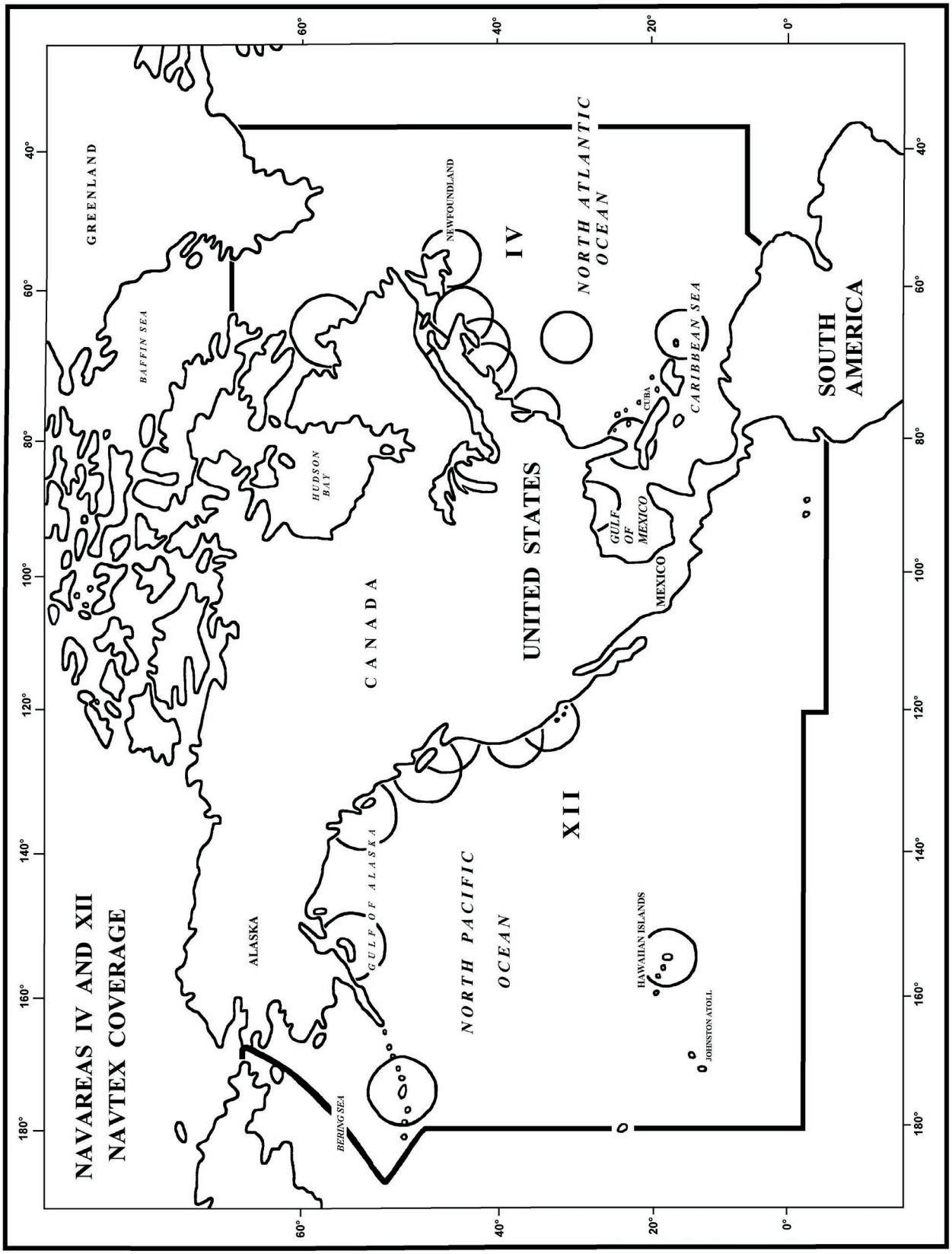
NAVAREAS IV AND XII
NAVTEX COVERAGE
GREENLAND
BAFFIN SEA
HUDSON BAY
CANADA
NEWFOUNDLAND
IV
NORTH ATLANTIC OCEAN
UNITED STATES
GULF OF MEXICO
MEXICO
CUBA
CARIBBEAN SEA
SOUTH AMERICA
ALASKA
GULF OF ALASKA
BERING SEA
NORTH PACIFIC OCEAN
XII
HAWAIIAN ISLANDS
JOHNSTON ATOLL
60°
40°
20°
0°
40°
60°
80°
100°
120°
140°
160°
180°

continued broadcasts of safety information over MF Morse frequencies on that date.

(380) The USCG voice broadcasts (Ch. 22A), often of more inshore and harbor information, will remain unaffected by NAVTEX. With NAVTEX, mariners who do not have the knowledge of Morse code necessary to receive safety messages, or who have difficulty receiving them on a timely basis, should find a significant advantage in owning a NAVTEX receiver. Mariners not able to man a radio on a 24-hour basis in order to hear critical warning messages (e.g. commercial fishermen) should also find a significant advantage in owning a NAVTEX receiver.

(381) See appendix, U.S. NAVTEX Transmitting Stations, for a list of NAVTEX broadcast stations (Atlantic Ocean) and message content.

(382) **NOAA Weather Radio.**–The National Weather Service operates **VHF-FM radio stations,** usually on frequencies **162.40, 162.475, or 162.55 MHz,** to provide continuous recorded weather broadcasts. These broadcasts are available to those with suitable receivers within about 40 miles of the antenna site. (See the appendix for a list of these stations in the area covered by this Coast Pilot.)

(383) **Commercial radiotelephone coast stations.**–Broadcasts of coastal weather and warnings are made by some commercial radiotelephone coast stations (marine operators) on the normal transmitting frequencies of the stations. Vessels with suitable receivers and desiring this service may determine the frequencies and schedules of these broadcasts from their local stations, from Selected Worldwide Marine Weather Broadcasts, or from the series of Marine Weather Services Charts published by NWS.

(384) **Local broadcast-band radio stations.**–Many local radio stations in the standard AM and FM broadcast band give local marine weather forecasts from NWS on a regular schedule. These stations are listed on the series of Marine Weather Services Charts published by NWS.

(385) **Reports from ships.**–The master of every U.S. ship equipped with radio transmitting apparatus, on meeting with a tropical cyclone, dangerous ice, subfreezing air temperatures with gale force winds causing severe ice accretion on superstructures, derelict, or any other direct danger to navigation, is required to cause to be transmitted a report of these dangers to ships in the vicinity and to the appropriate Government agencies.

(386) During the West Indies hurricane season, June 1 to November 30, ships in the Gulf of Mexico, Caribbean Sea area, southern North Atlantic Ocean, and the Pacific waters west of Central America and Mexico are urged to cooperate with NWS in furnishing these special reports in order that warnings to shipping and coastal areas may be issued.

(387) **Time Signals.**–The **National Institute of Standards and Technology (NIST)** broadcasts time signals continuously, day and night, from its radio stations **WWV,** near Fort Collins, Colorado, (40°49'49"N., 105°02'27"W.) on frequencies of 2.5, 5, 10, 15, and 20 MHz, and **WWVH,** Kekaha, Kauai, Hawaii (21°59'26"N., 159°46'00"W.) on frequencies 2.5, 5, 10, and 15 MHz. Services include time announcements, standard time intervals, standard audio frequencies, geophysical alerts, BCD (binary coded decimal) time code, UT1 time corrections, and high seas storm information.

(388) Time announcements are made every minute, commencing at 15 seconds before the minute by a female voice and at 7½ seconds before the minute by a male voice, from WWVH and WWV, respectively. The time given is in Coordinated Universal Time (UTC) and referred to the time at Greenwich, England, i.e., Greenwich Mean Time.

(389) **NIST Time and Frequency Dissemination Services, Special Publication 432**, gives a detailed description of the time and frequency dissemination services of the **National Institute of Standards and Technology.** Single copies may be obtained upon request from the National Institute of Standards and Technology, Time and Frequency Division, Boulder, CO 80303. Quantities may be obtained from the Government Printing Office (see appendix for address).

## NAUTICAL CHARTS

(390) **Reporting chart deficiencies.**–Users are requested to report all significant observed discrepancies in and desirable additions to NOS nautical charts, including depth information in privately maintained channels and basins; obstructions, wrecks, and other dangers; new landmarks or the nonexistence or relocation of charted ones; uncharted fixed private aids to navigation; and deletions or additions of small-craft facilities. All such reports should be sent to

(391) Chief,
(392) Marine Chart Division (N/CS2)
(393) National Ocean Service, NOAA,
(394) 1315 East-West Highway, Station 7317
(395) Silver Spring, MD 20910-3282.

(396) **Chart symbols and abbreviations.**–The standard symbols and abbreviations approved for use on all regular nautical charts are in **Chart No. 1,** United States of America **Nautical Chart Symbols and Abbreviations.** This product, maintained by the National Imagery and Mapping Agency and NOS, is available on the internet website address, http://chartmaker.ncd.noaa.gov.

(397) On certain foreign charts reproduced by the United States, and on foreign charts generally, the symbols and abbreviations used may differ from U.S. approved standards. It is, therefore, recommended that navigators who acquire and use foreign charts and reproductions procure the symbol sheet or Chart No. 1 produced by the same foreign agency.

(398) The mariner is warned that the buoyage systems, shapes, and colors used by other countries often have a different significance than the U.S. system.

(399) **Chart Datum.**–Chart Datum is the particular tidal datum to which soundings and depth curves on a nautical chart or bathymetric map are referred. The tidal datum of **Mean Low Water** has been used as Chart Datum along the east coast of the United States and in parts of the West Indies. It is presently being changed to Mean Lower Low Water, with no adjustments to soundings, shorelines, low water lines, clearances, heights, elevations, or in the application of tide predictions for navigational purposes. The tidal datum of **Mean Lower Low Water** is used as Chart Datum along the Gulf and west coasts; the coasts of Alaska, Hawaii, and other United States and United Nations islands of the Pacific; and in parts of the West Indies.

(400) Mean Low Water is defined as the arithmetic mean of all the low water heights observed over the National Tidal Datum Epoch. Mean Lower Low Water is defined as the arithmetic mean of the lower low water height of each tidal day (24.84 hours) observed over the National Tidal Datum Epoch. The National Tidal

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Datum Epoch is the specific 19-year period adopted by the National Ocean Service, NOAA, as the official time segment over which tide observations are taken and reduced to obtain mean values for tidal datums. The present Epoch is 1960 through 1978.

(401) **Horizontal Datum.**–Nautical charts presently are constructed based on one of a number of horizontal datums which are adopted to best represent individual regions around the world. Horizontal datum, horizontal geodetic datum, and horizontal control datum are synonymous.

(402) The exact placement of lines of latitude and longitude on a nautical chart is dependent on the referenced horizontal datum. Charts of the United States are currently referenced to datums such as the North American Datum of 1927 (NAD 27), Puerto Rican Datum, Old Hawaiian Datum, and others. Through the use of satellites and other modern surveying techniques, it is now possible to establish global reference systems.

(403) **North American Datum of 1983 (NAD 83)** is the new geodetic reference system (horizontal datum) for the United States and Canada. NAD 83 replaces the various datums used in the past on NOS charts, except charts of Hawaii, and other Pacific Ocean islands, which will be compiled on **World Geodetic System 1984 (WGS 84)**. WGS 84 is equivalent to the NAD 83 for charting purposes.

(404) The parameters of the ellipsoid of reference used with NAD 83 are very close to those used for WGS 84. The ellipsoid used for NAD 83, **Geodetic Reference System 1980 (GRS 80)**, is earth centered or geocentric as opposed to the nongeocentric ellipsoids previously employed. This means that the center of the ellipsoid coincides with the center of mass of the earth.

(405) Many NOS charts have been converted to NAD 83. The NOS publication **Dates of Latest Editions**, published quarterly indicates, to date, which NOS charts have been published to NAD 83.

(406) What does this change in datum mean to the mariner? It means that during the period of conversion, some charts will be referenced to the new NAD 83 datum, while others will still be referenced to the old former datum. Charted features will remain unaffected in their relationship with the surrounding area. Therefore, when comparing charts of the same area, referenced to different horizontal datums, no changes to charted features will be noticed since all features shift by approximately the same amount. The apparent difference will be the shift of the latitude and longitude grid in relation to the charted features. As a result, the geographic positions (latitude and longitude) of all charted features will change.

(407) Each NOS chart that is published carries a standard horizontal datum note identifying the datum used on that chart.

(408) **Case I**: In addition to the standard horizontal datum note, all charts that have been converted to NAD 83 will carry an additional Horizontal Datum Note, similar to the one below, that will inform the mariner if any correction must be made to the latitude and longitude when transferring geographic positions from the previous charted datum to NAD 83.

(409) **Sample Horizontal Datum Note** (on chart 13272, Boston Inner Harbor):

(410) "**HORIZONTAL DATUM**

(411) The horizontal reference datum of this chart is North American Datum of 1983 (NAD 83), which for charting purposes is considered equivalent to the World Geodetic System 1984 (WGS 84). Geographic positions referred to the North American Datum of 1927 must be corrected an average of 0.351" northward and 1.819" eastward to agree with this chart."

(412) For example: One of the coordinates of the anchorage of 33 CFR 110.30(m), Boston Inner Harbor A, is the point 42°21'31.62"N, 71°02'52.37"W. When this anchorage was originally laid out, chart 13272, was on horizontal datum of NAD 27. The current edition of chart 13272 is on NAD 83. Accordingly, to plot the above point on the current chart, first add 0.351" to the latitude and subtract 1.819" from the longitude.

(413) **Case II**. When the magnitude of the shift between the existing chart datum and NAD 83 does not result in a significant plottable difference, on a chart converted to NAD 1983, a note similar to the following appears on the chart:

(414) "**HORIZONTAL DATUM**

(415) The horizontal reference datum of this chart is North American Datum of 1983 (NAD 83), which for charting purposes is considered equivalent to the World Geodetic System 1984 (WGS 84). Geographic positions referred to (name of the old datum) do not require conversion to NAD 83 for plotting on this chart."

(416) **Case III**. If a chart is not yet on NAD 83, and NOS re-publishes same without converting it to NAD 83, a note similar to the following appears on the chart:

(417) "**HORIZONTAL DATUM**

(418) The horizontal reference datum of this chart is (name of the datum). Geographic positions on North American Datum of 1983 (NAD 83) must be corrected an average of _____ "northward/southward and _____" eastward/westward to agree with this chart. For charting purposes, NAD 83 is considered equivalent to the World Geodetic System of 1984 (WGS 1984) datum."

(419) Nautical chart changes by NOS involving latitude and longitude coordinates, published in Notices to Mariners, include which horizontal datum was used for the coordinates.

(420) Federal Regulations published by the Coast Guard (in **33 CFR**) involving geographic positions (latitude and longitude) include which horizontal datum was used for the coordinates. For example, **33 CFR 110.238**, Apra Harbor, Guam, contains "Datum: (WGS 84)".

(421) **Accuracy of a nautical chart.**–The value of a nautical chart depends upon the accuracy of the surveys on which it is based. The chart reflects what was found by field surveys and what has been reported to NOS Headquarters. The chart represents general conditions at the time of surveys or reports and does not necessarily portray present conditions. Significant changes may have taken place since the date of the last survey or report.

(422) Each sounding represents an actual measure of depth and location at the time the survey was made, and each bottom characteristic represents a sampling of the surface layer of the sea bottom at the time of the sampling. Areas where sand and mud prevail, especially the entrances and approaches to bays and rivers exposed to strong tidal current and heavy seas, are subject to continual change.

(423) In coral regions and where rocks and boulders abound, it is always possible that surveys may have failed to find every obstruction. Thus, when navigating such waters, customary routes and channels should be followed and areas avoided where irregular and sudden changes in depth indicate conditions associated with pinnacle rocks, coral heads, or boulders.

| ERA | SOUNDING TECHNOLOGY | MAXIMUM LINE SPACING | AREAS OR DEPTHS |
|---|---|---|---|
| PRE-1940 | Leadline | 50 Meters<br><br>200 - 300 Meters<br>0.5 Mile<br>1 - 4 Miles<br><br>Reduced as Necessary | Anchorages, Channel Lines<br>**Open Coast**<br>Even Bottom<br>0 - 10 Fathoms<br>10 - 15 Fathoms<br>15 - 100 Fathoms<br><br>Uneven Bottom |
| 1940 TO 1989 | Continuous Recording Echo-sounder | 50 Meters<br>100 Meters<br>200 Meters<br>400 Meters<br><br>100 Meters<br><br>200 Meters<br>400 Meters<br>800 Meters<br>1600 Meters | **Harbors & Restricted Areas**<br>Shoal Development<br>< 20 Fathoms<br>20 - 30 Fathoms<br>> 30 Fathoms<br><br>**Open Coast**<br>Irregular Bottom<br><20 Fathoms (Rocky points, spits & channel entrances)<br>Smooth Bottom<br>< 20 Fathoms (All Other Areas)<br>20 - 30 Fathoms<br>30 - 110 Fathoms<br>110 - 500 Fathoms |
| 1989 TO PRESENT | Continuous Recording Echo-sounder (Metrication) | 100 Meters<br>200 Meters<br>400 Meters<br><br>100 Meters<br><br>200 Meters<br>400 Meters<br>800 Meters<br>1600 Meters | **Harbors & Restricted Areas**<br>< 30 Meters<br>30-50 Meters<br>> 50 Meters<br><br>**Open Coast**<br><30 Meters (Rocky points, spits & channel entrances)<br><30 Meters (All Other Areas)<br>30 - 50 Meters<br>50 - 200 Meters<br>200 - 900 Meters |

(424) Information charted as "reported" should be treated with caution in navigating the area, because the actual conditions have not been verified by government surveys.

(425) **CAUTION: DO NOT USE A NEW CHART OR PUBLICATION UNTIL IT IS ANNOUNCED IN THE NOTICE TO MARINERS.** It is not considered a valid document until it is announced in the Notice to Mariners. The **date of a chart** is also of vital importance to the navigator. When charted information becomes obsolete, further use of the chart for navigation may be dangerous. The publication, **Dates of the Latest Editions**, published quarterly, gives the edition and date of the latest edition of charts published by NOS. It is distributed to sales agents; free copies may be obtained from the sales agents or by writing to Distribution Division (N/ACC3), National Ocean Service. (See appendix for address.)

(426) **Source Diagrams.**–The Office of Coast Survey is committed to adding a source diagram to all charts 1:500,000 scale and larger. This diagram is intended to provide the mariner with additional information about the density, age, and reliability of the sounding data depicted on the chart. The adequacy with which sounding data depicts the configuration of the bottom depends on the following factors:

(427) • Survey technology employed (sounding and navigation equipment).

(428) • Survey specifications in effect (prescribed survey line spacing and sounding interval).

(429) • Type of bottom (e.g., rocky with existence of submerged pinnacles, flat sandy, coastal deposits subject to frequent episodes of deposition and erosion).

(430) Depth information on nautical charts is based on soundings from the latest available hydrographic survey, which in many cases may be quite old. The age of hydrographic surveys supporting nautical charts varies. Approximately 60 percent of inshore hydrography was acquired by **leadline** (pre-1940) sounding technology.

(431) The sounding information portrayed on NOAA nautical charts is considered accurate but does not, as noted above, represent a complete picture of the seafloor because older sounding technologies only collected discrete samples. For example, a leadline survey provides only a single point sounding. **Electronic echo sounders,** which came into common use during the 1940's, collected continuous soundings along the path of the survey vessel, but no information between survey lines. Full bottom coverage technology which came into use as a supplemental method in the early 1990's, has made leadline and conventional

echo sounder technologies obsolete in areas of complex bathymetry.

(432) The following shows the eras of survey technology and their impact on the adequacy with which the bottom configuration is portrayed.

(433) Prior to 1940: The majority of survey data acquired prior to 1940 consisted of leadline soundings which were positioned using horizontal sextant angles. This positioning method is considered to be accurate.

(434) A deficiency with pre-1940 data exists in the leadline sounding method because it represents discrete single-point sampling. Depths of areas between or outside of leadline sounding points can only be inferred or estimated leaving the possibility of undetected features, especially in areas of irregular relief.

(435) 1940 to present: During this period sounding data has been collected using continuous recording single-beam echo sounders which yield a graphic record of the entire sounding line–not just isolated points. Using this graphic record, features which fall between the standard position fixes can be inserted into the data set. Positioning of the sounding vessel in this era has varied from horizontal sextant angles to modern Global Positioning System satellite fixes.

(436) Although the sampling is continuous along the track of the sounding vessel, features can be missed between sounding lines.

(437) The spacing of sounding lines required to survey an area depends on several factors; such as water depths, bottom configuration, survey scale, general nature of the area, and the purpose of the survey. For example, a 1:10,000-scale survey conducted in an estuary will typically have 100-meter line spacing requirements, but may be reduced to 50 meters or less to adequately develop an irregular bottom, shoal, or some other feature that may present a hazard to navigation. Also, hydrographic project instructions for surveys may have required line spacing that deviates from these general specifications.

(438) The table shows the various sounding technologies, line spacings, and areas or depths for each given period of hydrographic surveying. The terminology used to describe the different types of bottom in the table are derived from the first through fourth editions of the Hydrographic Manual and Hydrographic Survey Guideline No. 69.

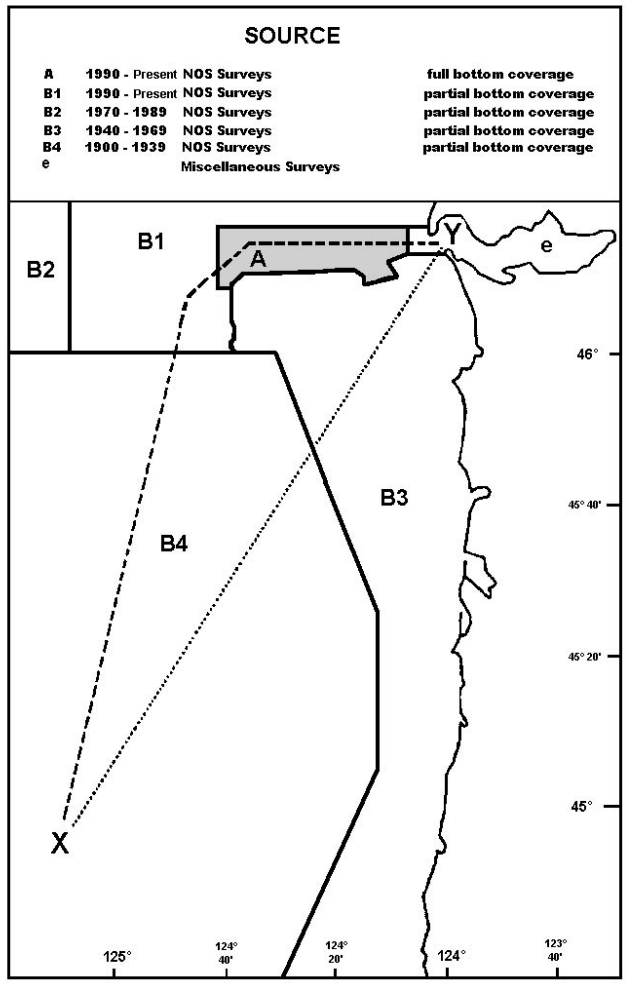
(439) Referring to the accompanying sample Source Diagram and the above discussion of survey methods over time, a mariner transiting from Point X to Point Y, along the track indicated by the **dotted line**, would have the following information available about the relative quality of the depth information shown on the chart.

(440) Point X lies in an area surveyed by NOS within the 1900-1939 time period. The sounding data would have been collected by leadline. Depths between sounding points can only be inferred, and undetected features might exist between the sounding points in areas of irregular relief. Caution should be exercised.

(441) The transit then crosses an area surveyed by NOS within the 1940-1969 time period. The sounding data would have been collected by continuous recording single beam echo sounder. It is possible that features could have been missed between sounding lines, although echo sounders record all depths along a sounding line with varying beam widths.

(442) The transit ends in an area charted from miscellaneous surveys. These surveys may be too numerous to depict or vary in age, reliability, origin, or technology used. No inferences about the fitness of the data can be made in this area from the diagram.

**SOURCE DIAGRAM**




(443) Referring again to the accompanying sample Source Diagram, and the above discussion of survey methods over time, a mariner could choose to transit from Point X to Point Y, along the track shown with a **dashed line**.

(444) The transit starts again in an area surveyed by NOS within the 1900-1939 time period. The sounding data would have been collected by leadline. Depths between sounding points can only be inferred, and undetected features might exist between sounding points in areas of irregular relief. Caution should be exercised.

(445) The transit then crosses an area surveyed by NOS within the 1990-1999 time period. The data is collected in metric units and acquired by continuous recording single beam echo sounder. It is possible that features could have been missed between sounding lines, although echo sounders record all depths along a sounding line with varying beam widths.

(446) The transit then crosses an area surveyed by NOS within the 1990-1999 time period. This area of the charted diagram is shaded with a blue screen to draw attention to the fact that full bottom coverage has been achieved. The data would have been collected in metric units and acquired by side scan sonar or

multibeam technology. Undetected features in this area would be extremely unlikely.

(447) The transit ends in an area charted from miscellaneous surveys. These surveys may be too numerous to depict or vary in age, reliability, origin, or technology used. No inferences about the fitness of the data can be made in this area from the diagram.

(448) By choosing to transit along the track shown by the dashed line, the mariner would elect to take advantage of more recent survey information collected with more modern technology.

(449) **U.S. Nautical Chart Numbering System.**–This chart numbering system, adopted by the National Ocean Service and the National Imagery and Mapping Agency, provides for a uniform method of identifying charts published by both agencies. Nautical charts published by the National Imagery and Mapping Agency are identified in the Coast Pilot by an asterisk preceding the chart number.

(450) **Corrections to charts.**–It is essential for navigators to keep charts corrected through information published in the notices to mariners, especially since the NOS no longer hand-corrects charts prior to distribution.

(451) **Caution in using small-scale charts.**–Dangers to navigation cannot be shown with the same amount of detail on small-scale charts as on those of larger scale. Therefore, the largest scale chart of an area should always be used.

(452) The **scales of nautical charts** range from 1:2,500 to about 1:5,000,000. Graphic scales are generally shown on charts with scales of 1:80,000 or larger, and numerical scales are given on smaller scale charts. NOS charts are classified according to scale as follows:

(453) **Sailing charts,** scales 1:600,000 and smaller, are for use in fixing the mariner's position as he approaches the coast from the open ocean, or for sailing between distant coastwise ports. On such charts the shoreline and topography are generalized and only offshore soundings, and the principal lights, outer buoys, and landmarks visible at considerable distances are shown.

(454) **General charts,** scales 1:150,000 to 1:600,000, are for coastwise navigation outside of outlying reefs and shoals.

(455) **Coast charts,** scales 1:50,000 to 1:150,000 are for inshore navigation leading to bays and harbors of considerable width and for navigating large inland waterways.

(456) **Harbor charts,** scales larger than 1:50,000, are for harbors, anchorage areas, and the smaller waterways.

(457) **Special charts,** various scales, cover the Intracoastal waterways and miscellaneous small-craft areas.

(458) **Blue tint in water areas.**–A blue tint is shown in water areas on many charts to accentuate shoals and other areas considered dangerous for navigation when using that particular chart. Since the danger curve varies with the intended purpose of a chart a careful inspection should be made to determine the contour depth of the blue tint areas.

(459) **Caution on bridge and cable clearances.**–For bascule bridges whose spans do not open to a full vertical position, unlimited overhead clearance is not available for the entire charted horizontal clearance when the bridge is open, due to the inclination of the drawspans over the channel.

(460) The charted clearances of overhead cables are for the lowest wires at mean high water unless otherwise stated. **Vessels with masts, stacks, booms, or antennas should allow sufficient clearance under power cables to avoid arcing.**

(461) **Submarine cables and submerged pipelines** cross many waterways used by both large and small vessels, but all of them may not be charted. For inshore areas, they usually are buried beneath the seabed, but, for offshore areas, they may lie on the ocean floor. Warning signs are often posted to warn mariners of their existence.

(462) The installation of submarine cables or pipelines in U.S. waters or the Continental Shelf of the United States is under the jurisdiction of one or more Federal agencies, depending on the nature of the installation. They are shown on the charts when the necessary information is reported to NOS and they have been recommended for charting by the cognizant agency. The chart symbols for submarine cable and pipeline areas are usually shown for inshore areas, whereas, chart symbols for submarine cable and pipeline routes may be shown for offshore areas. Submarine cables and pipelines are not described in the Coast Pilots.

(463) In view of the serious consequences resulting from damage to submarine cables and pipelines, vessel operators should take special care when anchoring, fishing, or engaging in underwater operations near areas where these cables or pipelines may exist or have been reported to exist. Mariners are also warned that the areas where cables and pipelines were originally buried may have changed and they may be exposed; extreme caution should be used when operating vessels in depths of water comparable to the vessel's draft.

(464) Certain cables carry high voltage, while many pipelines carry natural gas under high pressure or petroleum products. Electrocution, fire, or explosion with injury, loss of life, or a serious pollution incident could occur if they are broached.

(465) Vessels fouling a submarine cable or pipeline should attempt to clear without undue strain. Anchors or gear that cannot be cleared should be slipped, but no attempt should be made to cut a cable or a pipeline.

(466) **Artificial obstructions to navigation.–Disposal areas** are designated by the U.S. Army Corps of Engineers for depositing dredged material where existing depths indicate that the intent is not to cause sufficient shoaling to create a danger to surface navigation. The areas are charted without blue tint, and soundings and depth curves are retained.

(467) **Disposal Sites** are areas established by Federal regulation (**40 CFR 220-229**) in which dumping of dredged and fill material and other nonbuoyant objects is allowed with the issuance of a permit. Dumping of dredged and fill material is supervised by the Corps of Engineers and all other dumping by the Environmental Protection Agency (EPA). (See U.S. Army Corps of Engineers and Environmental Protection Agency, this chapter, and appendix for office addresses.)

(468) **Dumping Grounds** are also areas that were established by Federal regulation (**33 CFR 205**). However, these regulations have been revoked and the use of the areas discontinued. These areas will continue to be shown on nautical charts until such time as they are no longer considered to be a danger to navigation.

(469) Disposal Sites and Dumping Grounds are rarely mentioned in the Coast Pilot, but are shown on nautical charts. **Mariners are advised to exercise caution in and in the vicinity of all dumping areas.**

(470) **Spoil areas** are for the purpose of depositing dredged material, usually near and parallel to dredged channels; they are usually a hazard to navigation. Spoil areas are usually charted from survey drawings from U.S. Army Corps of Engineers after-dredging surveys, though they may originate from private or

other Government agency surveys. Spoil areas are tinted blue on the charts and labeled, and all soundings and depth curves are omitted. Navigators of even the smallest craft should avoid crossing spoil areas.

(471) **Fish havens** are established by private interests, usually sport fishermen, to simulate natural reefs and wrecks that attract fish. The reefs are constructed by intentional placement of assorted secondary-use materials and designed fishery habitat ranging from old trolley cars and barges to scrap building material in areas which may be of very small extent or may stretch a considerable distance along a depth curve; old automobile bodies are a commonly used material. The Corps of Engineers must issue a permit, specifying the location and depth over the reef, before such a reef may be built. However, the reefbuilders' adherence to permit specifications can be checked only with a wire drag. Fish havens are outlined and labeled on the charts and show the minimum authorized depth when known. Fish havens are tinted blue if they have a minimum authorized depth of 11 fathoms or less or if the minimum authorized depth is unknown and they are in depths greater than 11 fathoms but still considered a danger to navigation. Navigators should be cautious about passing over fish havens or anchoring in their vicinity.

(472) **Fishtrap areas** are areas established by the U.S. Army Corps of Engineers, or State or local authority, in which traps may be built and maintained according to established regulations. The fish stakes which may exist in these areas are obstructions to navigation and may be dangerous. The limits of fishtrap areas and a cautionary note are usually charted. Navigators should avoid these areas.

(473) **Local magnetic disturbances.**–If measured values of magnetic variation differ from the expected (charted) values by several degrees, a magnetic disturbance note will be printed on the chart. The note will indicate the location and magnitude of the disturbance, but the indicated magnitude should not be considered as the largest possible value that may be encountered. Large disturbances are more frequently detected in the shallow waters near land masses than on the deep sea. Generally, the effect of a local magnetic disturbance diminishes rapidly with distance, but in some locations there are multiple sources of disturbances and the effects may be distributed for many miles.

(474) **Compass roses on charts.**–Each compass rose shows the date, magnetic variation, and the annual change in variation. Prior to the new edition of a nautical chart, the compass roses are reviewed. Corrections for annual change and other revisions may be made as a result of newer and more accurate information. On some general and sailing charts, the magnetic variation is shown by isogonic lines in addition to the compass roses.

(475) The **Mercator projection** used on most nautical charts has straight-line meridians and parallels that intersect at right angles. On any particular chart the distances between meridians are equal throughout, but distances between parallels increase progressively from the Equator toward the poles, so that a straight line between any two points is a rhumb line. This unique property of the Mercator projection is one of the main reasons why it is preferred by the mariner.

(476) **Echo soundings.**–Ship's echo sounders may indicate small variations from charted soundings; this may be due to the fact that various corrections (instrument corrections, settlement and squat, draft, and velocity corrections) are made to echo soundings in surveying which are not normally made in ordinary navigation, or to observational errors in reading the echo sounder. Instrument errors vary between different equipment and must be determined by calibration aboard ship. Most types of echo sounders are factory calibrated for a velocity of sound in water of 800 fathoms per second, but the actual velocity may differ from the calibrated velocity by as much as 5 percent, depending upon the temperature and salinity of the waters in which the vessel is operating; the highest velocities are found in warm, highly saline water, and the lowest in icy freshwater. Velocity corrections for these variations are determined and applied to echo soundings during hydrographic surveys. All echo soundings must be corrected for the vessel's draft, unless the draft observation has been set on the echo sounder.

(477) Observational errors include misinterpreting false echos from schools of fish, seaweed, etc., but the most serious error which commonly occurs is where the depth is greater than the scale range of the instrument; a 400–fathom scale indicates 15 fathoms when the depth is 415 fathoms. Caution in navigation should be exercised when wide variations from charted depths are observed.

## AIDS TO NAVIGATION

(478) **Reporting of defects in aids to navigation.**–Promptly notify the nearest Coast Guard District Commander if an aid to navigation is observed to be missing, sunk, capsized, out of position, damaged, extinguished, or showing improper characteristics.

(479) Radio messages should be prefixed "Coast Guard" and transmitted directly to any U.S. Government shore radio station for relay to the Coast Guard District Commander. Merchant ships may send messages relating to defects noted in aids to navigation through commercial facilities only when they are unable to contact a U.S. Government shore radio station. Charges for these messages will be accepted "collect" by the Coast Guard.

(480) **Lights.**–The range of visibility of lights as given in the Light Lists and as shown on the charts is the **Nominal range,** which is the maximum distance at which a light may be seen in clear weather (meteorological visibility of 10 nautical miles) expressed in nautical miles. The Light Lists give the Nominal ranges for all Coast Guard lighted aids except range and directional lights. **Luminous range** is the maximum distance at which a light may be seen under the existing visibility conditions. By use of the diagram in the Light Lists, Luminous range may be determined from the known Nominal range, and the existing visibility conditions. Both the Nominal and Luminous ranges do not take into account elevation, observer's height of eye, or the curvature of the earth. **Geographic range** is a function of only the curvature of the earth and is determined solely from the heights above sea level of the light and the observer's eye; therefore, to determine the actual Geographic range for a height of eye, the Geographic range must be corrected by a distance corresponding to the height difference, the distance correction being determined from a table of "distances of visibility for various heights above sea level." (See Light List or Coast Pilot table following appendix.) The maximum distances at which lights can be seen may at times be increased by abnormal atmospheric refraction and may be greatly decreased by unfavorable weather conditions such as fog, rain, haze, or smoke. All except the most powerful lights are easily obscured by such conditions. In some conditions of the atmosphere white lights may have a reddish hue. During weather conditions which tend to reduce visibility, colored lights are

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more quickly lost to sight than are white lights. Navigational lights should be used with caution because of the following conditions that may exist;

(481) A light may be extinguished and the fact not reported to the Coast Guard for correction, or a light may be located in an isolated area where it will take time to correct.

(482) In regions where ice conditions prevail the lantern panes of unattended lights may become covered with ice or snow, which will greatly reduce the visibility and may also cause colored lights to appear white.

(483) Brilliant shore lights used for advertising and other purposes, particularly those in densely populated areas, make it difficult to identify a navigational light.

(484) At short distances flashing lights may show a faint continuous light between flashes.

(485) The distance of an observer from a light cannot be estimated by its apparent intensity. The characteristics of lights in an area should always be checked in order that powerful lights visible in the distance will not be mistaken for nearby lights showing similar characteristics at low intensity such as those on lighted buoys.

(486) The apparent characteristic of a complex light may change with the distance of the observer, due to color and intensity variations among the different lights of the group. The characteristic as charted and shown in the Light List may not be recognized until nearer the light.

(487) Motion of a vessel in a heavy sea may cause a light to alternately appear and disappear, and thus give a false characteristic.

(488) Where lights have different colored sectors, be guided by the correct bearing of the light; do not rely on being able to accurately observe the point at which the color changes. On either side of the line of demarcation of colored sectors there is always a small arc of uncertain color.

(489) On some bearings from the light, the range of visibility of the light may be reduced by obstructions. In such cases, the obstructed arc might differ with height of eye and distance. When a light is cut off by adjoining land and the arc of visibility is given, the bearing on which the light disappears may vary with the distance of the vessel from which observed and with the height of eye. When the light is cut off by a sloping hill or point of land, the light may be seen over a wider arc by a ship far off than by one close to.

(490) Arcs of circles drawn on charts around a light are not intended to give information as to the distance at which it can be seen, but solely to indicate, in the case of lights which do not show equally in all directions, the bearings between which the variation of visibility or obscuration of the light occurs.

(491) Lights of equal candlepower but of different colors may be seen at different distances. This fact should be considered not only in predicting the distance at which a light can be seen, but also in identifying it.

(492) Lights should not be passed close aboard, because in many cases riprap mounds are maintained to protect the structure against ice damage and scouring action.

(493) Many prominent towers, tanks, smokestacks, buildings, and other similar structures, charted as landmarks, display flashing and/or fixed red aircraft obstruction lights. Lights shown from landmarks are charted only when they have distinctive characteristics to enable the mariner to positively identify the location of the charted structure.

(494) **Articulated lights.**–An articulated light is a vertical pipe structure supported by a submerged buoyancy chamber and attached by a universal coupling to a weighted sinker on the seafloor. The light, allowed to move about by the universal coupling, is not as precise as a fixed aid. However, it has a much smaller watch circle than a conventional buoy, because the buoyancy chamber tends to force the pipe back to a vertical position when it heels over under the effects of wind, wave, or current.

(495) **Articulated daybeacons.**–Same description as for articulated lights (see above) except substitute daybeacon for light.

(496) **Bridge lights and clearance gages.**–The Coast Guard regulates marine obstruction lights and clearance gages on bridges across navigable waters. Where installed, clearance gages are generally vertical numerical scales, reading from top to bottom, and show the actual vertical clearance between the existing water level and the lowest point of the bridge over the channel; the gages are normally on the right-hand pier or abutment of the bridge, on both the upstream and downstream sides.

(497) Bridge lights are fixed red or green, and are privately maintained; they are generally not charted or described in the text of the Coast Pilot. All bridge piers (and their protective fenders) and abutments which are in or adjacent to a navigation channel are marked on all channel sides by red lights. On each channel span of a fixed bridge, there is a range of two green lights marking the center of the channel and a red light marking both edges of the channel, except that when the margins of the channel are confined by bridge piers, the red lights on the span are omitted, since the pier lights then mark the channel edges; for multiplespan fixed bridges, the main-channel span may also be marked by three white lights in a vertical line above the green range lights.

(498) On all types of drawbridges, one or more red lights are shown from the drawspan (higher than the pier lights) when the span is closed; when the span is open, the higher red lights are obscured and one or two green lights are shown from the drawspan, higher than the pier lights. The number and location of the red and green lights depend upon the type of drawbridge.

(499) Bridges and their lighting, construction and maintenance are set forth in **33 CFR 114, 115, 116, and 118,** (not carried in this Coast Pilot). Aircraft obstruction lights prescribed by the Federal Aviation Administration, may operate at certain bridges.

(500) **Fog signals.**–Caution should be exercised in the use of sound fog signals for navigation purposes. They should be considered solely as warning devices.

(501) Sound travels through the air in a variable manner, even without the effects of wind; and, therefore, the hearing of fog signals cannot be implicitly relied upon.

(502) Experience indicates that distances must not be judged only by the intensity of the sound; that occasionally there may be areas close to a fog signal in which it is not heard; and that fog may exist not far from a station, yet not be seen from it, so the signal may not be operating. It is not always possible to start a fog signal immediately when fog is observed.

(503) **Avoidance of collision with offshore light stations and large navigational buoys (LNB).**–Courses should invariably be set to pass these aids with sufficient clearance to avoid the possibility of collision from any cause. Errors of observation, current and wind effects, other vessels in the vicinity, and defects in steering gear may be, and have been the cause of actual collisions, or imminent danger thereof, needlessly jeopardizing the

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safety of these facilities and their crews, and of all navigation dependent on these important aids to navigation.

(504) Experience shows that offshore light stations cannot be safely used as leading marks to be passed close aboard, but should always be left broad off the course, whenever sea room permits. When approaching fixed offshore light structures and large navigational buoys (LNB) on radio bearings, the risk of collision will be avoided by ensuring that radio bearing does not remain constant.

(505) It should be borne in mind that most large buoys are anchored to a very long scope of chain and, as a result, the radius of their swinging circle is considerable. The charted position is the location of the anchor. Furthermore under certain conditions of wind and current, they are subject to sudden and unexpected sheers which are certain to hazard a vessel attempting to pass close aboard.

(506) **Buoys.**–The aids to navigation depicted on charts comprise a system consisting of fixed and floating aids with varying degrees of reliability. Therefore, prudent mariners will not rely solely on any single aid to navigation, particularly a floating aid.

(507) The approximate position of a buoy is represented by the dot or circle associated with the buoy symbol. The approximate position is used because of practical limitations in positioning and maintaining buoys and their sinkers in precise geographical locations. These limitations include, but are not limited to, inherent imprecisions in position fixing methods, prevailing atmospheric and sea conditions, the slope of and the material making up the seabed, the fact that buoys are moored to sinkers by varying lengths of chain, and the fact that buoy body and/or sinker positions are not under continuous surveillance, but are normally checked only during periodic maintenance visits which often occur more than a year apart. The position of the buoy body can be expected to shift inside and outside of the charting symbol due to the forces of nature. The mariner is also cautioned that buoys are liable to be carried away, shifted, capsized, sunk, etc. Lighted buoys may be extinguished or sound signals may not function as a result of ice, running ice or other natural causes, collisions, or other accidents.

(508) For the foregoing reasons, a prudent mariner must not rely completely upon the charted position or operation of floating aids to navigation, but will also utilize bearings from fixed objects and aids to navigation on shore. Further, a vessel attempting to pass close aboard always risks collision with a yawing buoy or with the obstruction the buoy marks.

(509) Buoys may not always properly mark shoals or other obstructions due to shifting of the shoals or of the buoys. Buoys marking wrecks or other obstructions are usually placed on the seaward or channelward side and not directly over a wreck. Since buoys may be located some distance from a wreck they are intended to mark, and since sunken wrecks are not always static, extreme caution should be exercised when operating in the vicinity of such buoys.

(510) **Caution, channel markers.**–Lights, daybeacons, and buoys along dredged channels do not always mark the bottom edges. Due to local conditions, aids may be located inside or outside the channel limits shown by dashed lines on a chart. The Light List tabulates the offset distances for these aids in many instances.

(511) Aids may be moved, discontinued, or replaced by other types to facilitate dredging operations. Mariners should exercise caution when navigating areas where dredges with auxiliary equipment are working.

(512) Temporary changes in aids are not included on the charts.

(513) **Radio bearings.**–No exact data can be given as to the accuracy to be expected in radio bearings taken by a ship, since the accuracy depends to a large extent upon the skill of the ship's operator, the condition of the ship's equipment, and the accuracy of the ship's calibration curve. Mariners are urged to obtain this information for themselves by taking frequent radio bearings, when their ship's position is accurately known, and recording the results.

(514) Radio bearings obtained at twilight or at night, and bearings which are almost parallel to the coast, should be accepted with reservations, due to "night effect" and to the distortion of radio waves which travel overland. Bearings of aircraft ranges and standard broadcast stations should be used with particular caution due to coastal refraction and lack of calibration of their frequencies.

(515) **Conversion of radio bearings to Mercator bearings.**–Radio directional bearings are the bearings of the great circles passing through the radio stations and the ship, and, unless in the plane of the Equator or a meridian, would be represented on a Mercator chart as curved lines. Obviously it is impracticable for a navigator to plot such lines on a Mercator chart, so it is necessary to apply a correction to a radio bearing to convert it into a Mercator bearing, that is, the bearing of a straight line on a Mercator chart laid off from the sending station and passing through the receiving station.

(516) A table of corrections for the conversion of a radio bearing into a Mercator bearing follows the appendix. It is sufficiently accurate for practical purposes for distances up to 1,000 miles.

(517) The only data required are the latitudes and longitudes of the radiobeacons and of the ship by dead reckoning. The latter is scaled from the chart, and the former is either scaled from the chart or taken from the Light List.

(518) The table is entered with the differences of longitude in degrees between the ship and station (the nearest tabulated value being used), and opposite the middle latitude between the ship and station, the correction to be applied is read.

(519) The sign of the correction (bearings read clockwise from the north) will be as follows: In north latitude, the minus sign is used when the ship is east of the radiobeacon and the plus sign used when the ship is west of the radiobeacon. In south latitude, the plus sign is used when the ship is east of the radiobeacon, and the minus sign is used when the ship is west of the radiobeacon.

(520) To facilitate plotting, 180 degrees should be added to or subtracted from the corrected bearing, and the result plotted from the radiobeacon.

(521) Should the position by dead reckoning differ greatly from the true position of the ship as determined by plotting the corrected bearings, retrial should be made, using the new value as the position of the ship.

(522) **Radio bearings from other vessels.**–Any vessel with a radio direction-finder can take a bearing on a vessel equipped with a radio transmitter. These bearings, however, should be used only as a check, as comparatively large errors may be introduced by local conditions surrounding the radio direction-finder unless known and accounted for. Although any radio station, for which an accurate position is definitely known, may serve as a radiobeacon for vessels equipped with a radio direction-finder,

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extreme caution must be exercised in their use. Stations established especially for maritime services are more reliable.

(523) **SATELLITE POSITION INDICATING RADIO BEACON (EPIRB).**–Emergency position indicating radiobeacons (EPIRBs), devices which cost from $200 to over $2000, are designed to save your life if you get into trouble by alerting rescue authorities and indicating your location. EPIRB types are described in the accompanying table.

## EPIRB Types

| Type | Frequency | Description |
|---|---|---|
| Class A | 121.5/243 MHz | Float-free automatically activated, detectable by aircraft and satellite. Coverage limited (see Chart). |
| Class B | 121.5/243 MHz | Manually activated version of Class A. |
| Class C | VHF ch 15/16 | Manually activated, operates on maritime channels only. Not detectable by satellite. Not authorized after 2/1/99. |
| Class S | 121.5/243 MHz | Similar to Class B, except it floats, or is an integral part of a survival craft. |
| Cat I | 406/121.5 MHz | Float-free, automatically activated EPIRB. Detectable by satellite anywhere in the world. |
| Cat II | 406/121.5 MHz | Similar to Category I, except is manually activated. |

(524)

(525) **121.5/243 MHz EPIRBs.** These are the most common and least expensive type of EPIRB, designed to be detected by overflying commercial or military aircraft. Satellites were designed to detect these EPIRBs, but are limited for the following reasons:

(526) (i) Satellite detection range is limited for these EPIRBs (satellites must be within line of sight of both the EPIRB and a ground terminal for detection to occur) (see Chart),

(527) (ii) EPIRB design and frequency congestion cause these devices to be subject to a high false alert/false alarm rate (over 99%); consequently, confirmation is required before search and rescue forces can be deployed.

(528) (iii) EPIRBs manufactured before October 1989 may have design or construction problems (e.g. some models will leak and cease operating when immersed in water), or may not be detectable by satellite.

(529) **Class C EPIRBs.** These are manually activated devices intended for pleasure craft who do not venture far offshore and for vessels on the Great Lakes. They transmit a short burst on VHF-FM channel 16 and a longer homing signal on channel 15. Their usefulness depends upon a coast station or another vessel guarding channel 16 and recognizing the brief, recurring tone as an EPIRB. Class C EPIRBs are not recognized outside of the United States.

(530) New class C EPIRB stations will not be authorized after February 1, 1995. Class C EPIRB stations installed on board vessels before February 1, 1995, may be used until February 1, 1999, and not thereafter.

(531) **406 MHz EPIRBs.**–The 406 MHz EPIRB was designed to operate with satellites. Its signal allows a satellite local user terminal to accurately locate the EPIRB (much more accurately than 121.5/243 MHz devices), and identify the vessel (the signal is encoded with the vessel's identity) anywhere in the world (there is no range limitation). These devices also include a 121.5 MHz homing signal, allowing aircraft and rescue craft to quickly find the vessel in distress. These are the only type of EPIRB which must be certified by Coast Guard approved independent laboratories before they can be sold in the United States.

(532) All 406 MHz EPIRBs must be registered with NOAA. The beacon registration must be renewed every two years, and re-registered if you change your boat, your address, or your primary phone number. For information or to have the registration/re-registration form faxed, mariners can call: 1-888-212-7283, or go to the NOAA website to get the form at www.sarsat.noaa.gov. Mail the signed original form to:

(533) NOAA SARSAT Beacon Registration

(534) E/SP3, Room 3320, FB-4

(535) 5200 Auth Road

(536) Suitland, MD 20746-4304

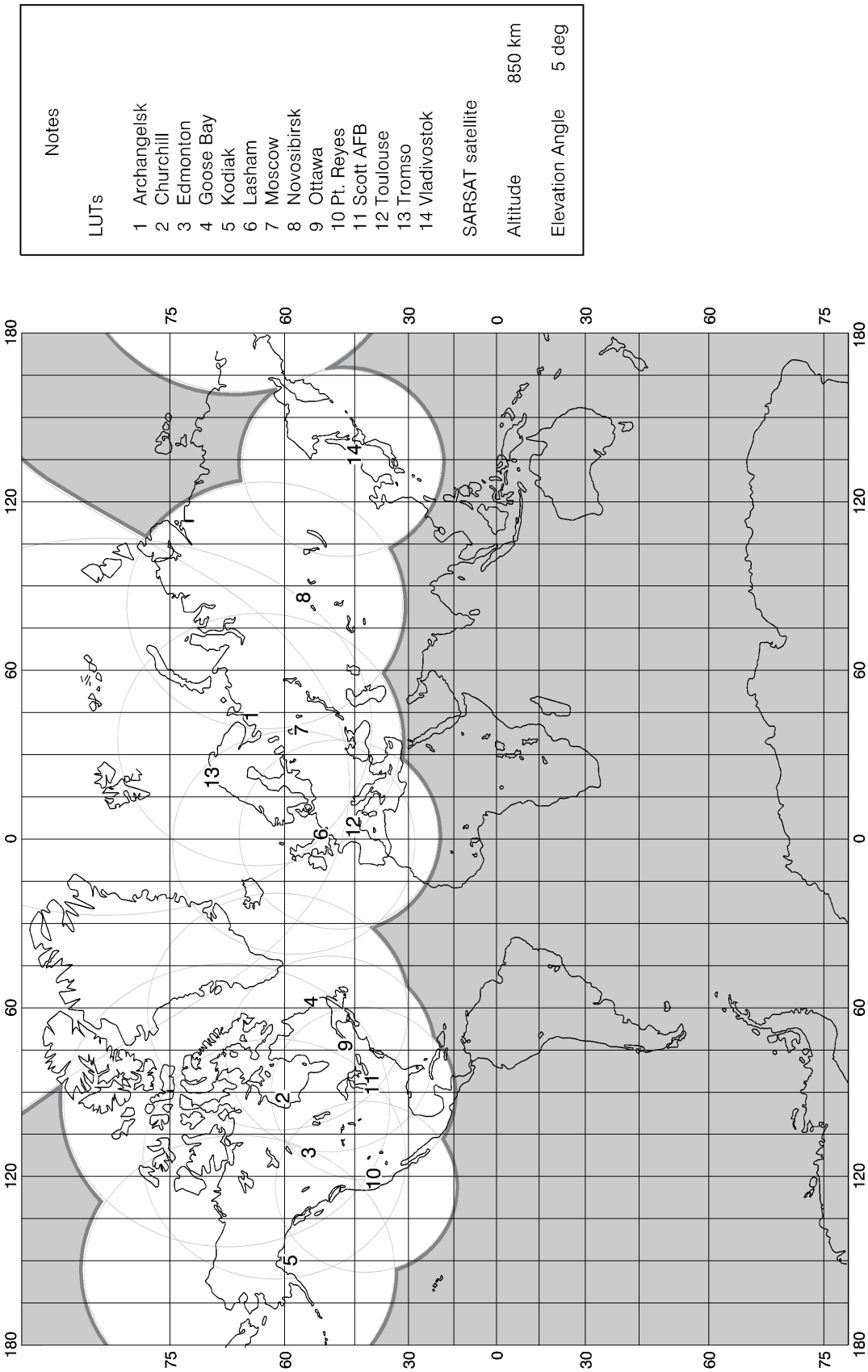
(537) Beacon registration/re-registration may be expedited by faxing a completed copy of the form to NOAA at 301-568-8649, as well as mailing the signed original form to the address above.

(538) By 1 August 1993, an automatically activated, float-free version of this EPIRB was required on Safety of Life at Sea Convention vessels (passenger ships and ships over 300 tons, on international voyages) of any nationality. The Coast Guard requires U.S. commercial fishing vessels carry this device (by May 1990, unless they carry a Class A EPIRB), and will require the same for other U.S. commercial uninspected vessels which travel more than 3 miles offshore.

(539) The **COSPAS-SARSAT system.**–COSPAS: Space System for Search of Distress Vessels (a Russian acronym); SARSAT: Search and Rescue Satellite-Aided Tracking. COSPAS-SARSAT is an international satellite-based search and rescue system established by the U.S., Russia, Canada and France to locate emergency radio beacons transmitting on the frequencies 121.5, 243 and 406 MHz. Since its inception only a few years ago, COSPAS-SARSAT has contributed to the saving of 1240 lives (as of June 6, 1989), 554 of these mariners. The Coast Guard operates two local user terminals, satellite earth stations designed to received EPIRB distress calls forwarded from COSPAS-SARSAT satellites, located in Kodiak, Alaska and Point Reyes, California. The Air Force operates a third terminal at Scott Air Force Base, Illinois.

(540) **Testing EPIRBs.**–The Coast Guard urges those owning EPIRBs to periodically examine them for water tightness, battery expiration date and signal presence. FCC rules allow Class A, B, and S EPIRBs to be turned on briefly (for three audio sweeps, or one second only) during the first five minutes of each hour. Signal presence can be detected by an FM radio tuned to 99.5 MHz, or an AM radio tuned to any vacant frequency and located close to an EPIRB. FCC rules allow Class C EPIRBs to be tested within the first five minutes of every hour, for not more than five seconds. Class C EPIRBs can be detected by a marine radio tuned to channel 15 or 16. 406 MHz EPIRBs can be tested through its self-test function, which is an integral part of the device.

(541) **Radar beacons (Racons)** are low-powered radio transceivers that operate in the marine radar X-band frequencies. When activated by a vessel's radar signal, **Racons** provide a




**1988 Satellite Visibility Area of SARSAT LUTs**
(represents approximate System coverage at 121.5 MHz;
at 406 MHz, the System covers the entire globe)

distinctive visible display on the vessel's radarscope from which the range and bearing to the beacon may be determined. (See Light List and NIMA Pub. 117 for details.)

(542) **LORAN-C.**–LORAN, an acronym for LOng RAnge Navigation, is an electronic aid to navigation consisting of shore-based radio transmitters. The LORAN system enables users equipped with a LORAN receiver to determine their position quickly and accurately, day or night, in practically any weather.

(543) A LORAN-C chain consists of three to five transmitting stations separated by several hundred miles. Within a chain, one station is designated as master while the other stations are designated as secondaries. Each secondary station is identified as either whiskey, x-ray, yankee, or zulu.

(544) The master station is always the first station to transmit. It transmits a series of nine pulses. The secondary stations then follow in turn, transmitting eight pulses each, at precisely timed intervals. This cycle repeats itself endlessly. The length of the cycle is measured in microseconds and is called a Group Repetition Interval (GRI).

(545) LORAN-C chains are designated by the four most significant digits of their GRI. For example, a chain with a GRI of 89,700 microseconds is referred to as 8970. A different GRI is used for each chain because all LORAN-C stations broadcast in the same 90 to 110 kilohertz frequency band and would otherwise interfere with one another.

(546) The LORAN-C system can be used in either a hyperbolic or range mode. In the widely used hyperbolic mode, a LORAN-C line of position is determined by measuring the time difference between sychronized pulses received from two separate transmitting stations. In the range mode, a line of position is determined by measuring the time required by LORAN-C pulses to travel from a transmitting station to the user's receiver.

(547) A user's position is determined by locating the crossing point of two lines of position on a LORAN-C chart. Many receivers have built-in coordinate converters which will automatically display the receiver's latitude and longitude. With a coordinate converter, a position can be determined using a chart that is not overprinted with LORAN-C lines of position.

(548) **CAUTION: The latitude/longitude computation on some models is based upon an all seawater propagation path. This may lead to error if the LORAN-C signals from the various stations involve appreciable overland propagation paths. These errors may put the mariner at risk in areas requiring precise positioning if the proper correctors (ASF) are not applied. Therefore, it is recommended that mariners using Coordinate Converters check the manufacturer's operating manual to determine if and how corrections are to be applied to compensate for the discontinuity caused by the overland paths.**

(549) There are two types of LORAN-C positioning accuracy: absolute and repeatable. Absolute accuracy is a measure of the navigator's ability to determine latitude and longitude position from the LORAN-C time differences measured. Repeatable accuracy is a measure of the LORAN-C navigator's ability to return to a position where readings have been taken before.

(550) The absolute positioning accuracy of LORAN-C is 0.25 nautical miles, 95% confidence within the published coverage area using standard LORAN-C charts and tables. Repeatable accuracy depends on many factors, so measurements must be taken to determine the repeatable accuracy in any given area. Coast Guard surveys have found repeatable accuracies between 30 and 170 meters in most ground wave coverage areas. LORAN-C position determination on or near the baseline extensions are subject to significant errors and, therefore, should be avoided whenever possible. The use of skywaves is not recommended within 250 miles of a station being used, and corrections for these areas are not usually tabulated.

(551) If the timing or pulse shape of a master-secondary pair deviates from specified tolerances, the first two pulses of the secondary station's pulse train will blink on and off. The LORAN-C receiver sees this blinking signal and indicates a warning to the user. This warning will continue until the signals are once again in tolerance. A blinking signal is not exhibited during off-air periods, so a separate receiver alarm indicates any loss of signal. Never use a blinking secondary signal for navigation.

(552) In coastal waters, LORAN-C should not be relied upon as the only aid to navigation. A prudent navigator will use radar, radio direction finder, fathometer and any other aid to navigation, in addition to the LORAN-C receiver.

(553) **LORAN-C Interference**

(554) Interference to LORAN-C may result from radio transmissions by public or private sources operating near the LORAN-C band of 90-110 kHz.

(555) **LORAN-C Charts and Publications**

(556) Navigational charts overprinted with LORAN-C lines of position are available from National Ocean Service, Distribution Division (N/ACC3). (See appendix for address).

(557) A general source of LORAN-C information is the LORAN-C User Handbook written by the U.S. Coast Guard. This publication can be purchased from the Government Printing Office, Washington, DC (see appendix for address)

(558) **GPS Navigation System.**–GPS is a space-based positioning, velocity, and time system that has three major segments: space, control, and user. The Space Segment is composed of 24 satellites in six orbital planes. The satellites operate in circular 20,200 km (10,900 nm) orbits at an inclination angle, relative to the equator, of 55° and with a 12-hour period. The system normally operates with twenty-one satellites in service, the remaining three serving as active spares. At any given time, a minimum of four satellites are observable from any position on earth, providing instantaneous position information. Each satellite transmits on two L band frequencies: 1575.42 MHz (L1) and 1227.6 MHz (L2). L1 carries a precise (P) code and a course/acquisition (C/A) code. L2 carries the P code. A navigation data message is superimposed on the codes. The same navigation data message is carried on both frequencies. This message contains satellite ephemeris data, atmospheric propagation correction data, and satellite clock bias.

(559) The Control Segment consists of five monitor stations, three of which have uplink capabilities, located in Colorado, Hawaii, Kwajalein, Diego Garcia, and Ascension Island. The monitor stations use a GPS receiver to passively track all satellites in view, accumulating ranging data from the satellites' signals. The information from the monitor stations is processed at the Master Control Station (MCS), located in Colorado Springs, CO, to determine satellite orbits and to update the navigation message of each satellite. The updated information is transmitted to the satellites via ground antennas. The ground antennas, located at Kwajelein, Diego Garcia, and Ascension Island, are also used for transmitting and receiving satellite control information.

(560) The User Segment consists of antennas and receiver-processors that provide positioning, velocity, and precise

timing to the user. The GPS receiver makes time-of-arrival measurements of the satellite signals to obtain the distance between the user and the satellites. The distance calculations, known as pseudoranges, together with range rate information, are converted to yield system time and the user's three-dimensional position and velocity with respect to the satellite system. A time coordination factor then relates the satellite system to earth coordinates. A minimum of four pseudoranges are needed to produce a three-dimensional fix (latitude, longitude, and altitude). GPS receivers compute fix information in terms of the **World Geodetic System (1984)**, which may need datum shift correction before it can be accurately plotted on a chart. **There are three different types of receivers**. **Sequential** receivers track only one satellite at a time, computing a fix after a series of pseudoranges have been sequentially measured; these receivers are inexpensive but slow. **Continuous** receivers have at least four channels to process information from several satellites simultaneously; these process fix information the fastest. **Multiplex** receivers switch at a fast rate from satellite to satellite, receiving and processing data from several satellites simultaneously, producing a fix by a sort of "round-robin" process.

(561) GPS provides two services for position determination, **Standard Positioning Service (SPS)** and **Precise Positioning Service (PPS)**. Accuracy of a GPS fix varies with the capability of the user equipment. SPS is the standard level of positioning and timing accuracy that is available, without restrictions, to any user on a continuous worldwide basis. SPS provides positions with a horizontal accuracy of approximately 100 meters. PPS, limited to authorized users, provides horizontal accuracy of 30 meters or less.

(562) **Differential GPS (DGPS)**:

(563) The U.S. Coast Guard provides a Differential GPS (**DGPS**) service for public use in all U.S. harbors and approach areas, including the Great Lakes, Puerto Rico, most of Alaska, and Hawaii. The system provides radionavigational accuracy of 10 meters or less. DGPS reference stations determine range errors and generate corrections for all GPS satellites in view. Monitor stations independently verify the quality of the DGPS broadcast. For further information and/or operational questions regarding GPS or DGPS, contact:

(564) Commanding Officer
(565) U.S. Coast Guard Navigation Center
(566) 7323 Telegraph Road
(567) Alexandria, VA 22310-3998
(568) TEL: (703) 313-5900; FAX: (703) 313-5920;
(569) Electronic Bulletin Board Service (703) 313-5910;
(570) Email: NISWS@smtp.navcen.uscg.mil.

(571) **LORAN-C, GPS, DGPS, AND GENERAL RADIONAVIGATION USER INFORMATION.**–The Commandant of the U.S. Coast Guard has consolidated radionavigation operational control, management, and information responsibilities of the Commandant Radionavigation Division (G-NRN), Commander Atlantic Area (ATL), and Commander Pacific Area (PTL) at one field unit, entitled Navigation Center (NAVCEN). NAVCEN address:

(572) Commanding Officer
(573) USCG Navigation Center
(574) 7323 Telegraph Road
(575) Alexandria, VA 22310-3998.

(576) A reorganized G-NRN Staff remains at Coast Guard Headquarters for policy and planning functions of the radionavigation program.

(577) NAVCEN provides the following services:

(578) **Computer Bulletin Board (BBS)**: The BBS provides Loran-C, GPS, Differential GPS (DGPS), and general radionavigation user information and status. It is accessed by computer users with modems. The Coast Guard does not charge for access to the BBS. Modem setup parameters: 8 bits, no parity, 1 stop; 300-14400 BAUD; call (703) 313-5910.

(579) **GPS System**: Current status recorded voice announcements are available; phone (703) 313-5907. Printed materials on GPS may also be obtained; phone (703) 313-5900.

(580) **Loran-C information**: the current operational status of all Loran-C stations is available from the coordinator of chain operations (**COCO**) or the **Regional Manager**. The COCO monitors the day-to-day operations of the Loran-C chain and provides information with a recorded telephone announcement or responds to queries directed to the COCO personally. The Regional Managers monitor the operation of the Loran-C chains in their areas. Pertinent telephone numbers follow:

(581) COCO Canadian east coast (CEC-5930) and Labrador Sea (LABSEA-7930) chains is located at Loran Monitor Station St. Anthony Newfoundland Canada. Recorded announcement: (709) 454-3261. COCO: (709) 454-2392.

(582) COCO Great Lakes (GKLS-8970) and northeast US (NEUS-9960) chains is located at Loran Station Seneca, NY. Recorded announcement: (607) 869-5395. COCO: (607) 869-1334.

(583) COCO southeast US (SEUS-7980) and south central US (SOCUS-9310) chains is located at Loran Station Malone, FL. Recorded announcement: (205) 899-5227. COCO: (205) 899-5225/6.

(584) Information concerning the Gulf of Alaska (7960), Canadian west coast (5990), US west coast (9940), Russian-American (5980), North Pacific (9990), and North Central US (8290) chains may be obtained from the USCG Pacific Area Loran-C Regional Manager in Alameda, CA at (510) 437-3232.

(585) European Loran-C information:

(586) Information concerning the Icelandic (9980), Norwegian Sea (7970), and Mediterranean Sea (7990) chains may be obtained from the Regional Manager at U.S. Coast Guard Activities Europe, London, UK at 011-44-71-872-0943. If additional information is required after contacting COCO'S or the Pacific or European Regional Managers, contact the NAVCEN by calling (703) 313-5900 or by writing: Commanding Officer (OPS), NAVCEN (address above).

(587) Scheduled Loran-C unusable times are published by announcements in USCG Local Notice to Mariners, Canadian Coast Guard Notice to Shipping (NOTSHIP'S), FAA Notice to Airmen (NOTAMS), FAA NOTAM "D"s, and on the pre-recorded service for the pertinent chain. In many cases scheduled outages are preceded by Coast Guard Marine Radio Voice and NAVTEX Broadcasts in the areas where coverage will be affected.

(588) Military or government users with an official **Government Plain Language Address (PLAD)** desiring inclusion on notification messages should request such in writing to NAVCEN; address above. Requests must include a point of contact, telephone number, why you need this service, and a Government PLAD. Due to the time sensitive nature of this information it is sent only by government message. These messages and other

Loran-C information are also available to the public in the Loran-C section of the NAVCEN Bulletin Board (BBS).

(589) If you have a problem with Loran, contact the applicable COCO or Regional Manager for the rate used. If you need to check about unusable time, system failures or report abnormalities, note the rate used, model of receiver, location, type of problem, date, and time occurred. This will enable the COCO or Regional Manager to quickly check the records for the period in question and to provide a more exact answer to you.

(590) **WWV and WWVH broadcasts**: Broadcasts from WWV of Fort Collins, CO and WWVH of Kekaha, Kauai, HI contain GPS information. Broadcasts are from WWV at 14 to 15 minutes after each hour and from WWVH at 43 to 44 minutes after each hour.

(591) **U.S. Naval Observatory**: The U.S. Naval Observatory (USNO) provides the following services: automated data services for Loran-C and GPS information: data service (menu driven) parameters - 8 bit, no parity, 1 stop, 1200 to 2400 BAUD, access password CESIUM133. Time service: (900) 410-8463 or (202) 762-1401. General information: (202) 762-1467.

(592) **National Oceanographic and Atmospheric Administration**: The U.S. Department of Commerce National Oceanographic and Atmospheric Administration (NOAA), Space Environment Services Center (SESC) disseminates information regarding solar activity, radio propagation, ionospheric, and geomagnetic conditions. For more information:

(593) For general information, and information about WWV and satellite broadcasts, write or call:

(594) U.S. Department of Commerce

(595) Space Environment Services Center, R/E/SE2

(596) 325 Broadway

(597) Boulder, CO 80303

(598) Telephone (303) 497-3171.

(599) **Uniform State Waterway Marking System.**–Many bodies of water used by boatmen are located entirely within the boundaries of a State. The Uniform State Waterway Marking System (USWMS) has been developed to indicate to the small-boat operator hazards, obstructions, restricted or controlled areas, and to provide directions. Although intended primarily for waters within the state boundaries, USWMS is suited for use in all water areas, since it supplements and is generally compatible with the Coast Guard lateral system of aids to navigation. The Coast Guard is gradually using more aids bearing the USWMS geometric shapes described below.

(600) Two categories of waterway markers are used. Regulatory markers, buoys, and signs use distinctive standard shape marks to show regulatory information. The signs are white with black letters and have a wide orange border. They signify speed zones, Fish havens, danger areas, and directions to various places. Aids to navigation on State waters use red and black buoys to mark channel limits. Red and black buoys are generally used in pairs. The boat should pass between the red buoy and its companion black buoy. If the buoys are not placed in pairs, the distinctive color of the buoy indicates the direction of dangerous water from the buoy. White buoys with red tops should be passed to the south or west, indicating that danger lies to the north or east of the buoy. White buoys with black tops should be passed to the north or east. Danger lies to the south or west. Vertical red and white striped buoys indicate a boat should not pass between the buoy and the nearest shore. Danger lies inshore of the buoy.

(601) **DESTRUCTIVE WAVES.**–Unusual sudden changes in water level can be caused by tsunamis or violent storms. These two types of destructive waves have become commonly known as **tidal waves,** a name which is technically incorrect as they are not the result of tide-producing forces.

(602) **Tsunamis (seismic sea waves)Seismic sea waves** are set up by submarine earthquakes. Many such seismic disturbances do not produce sea waves and often those produced are small, but the occasional large waves can be very damaging to shore installations and dangerous to ships in harbors.

(603) These waves travel great distances and can cause tremendous damage on coasts far from their source. The wave of April 1, 1946, which originated in the Aleutian Trench, demolished nearby Scotch Cap Lighthouse and caused damages of $25 million in the Hawaiian Islands 2,000 miles away. The wave of May 22-23, 1960, which originated off Southern Chile, caused widespread death and destruction in islands and countries throughout the Pacific.

(604) The speed of tsunamis varies with the depth of the water, reaching 300 to 500 knots in the deep water of the open ocean. In the open sea they cannot be detected from a ship or from the air because their length is so great, sometimes a hundred miles, as compared to their height, which is usually only a few feet (a meter or 2). Only on certain types of shelving coasts do they build up into waves of disastrous proportions.

(605) There is usually a series of waves with crests 10 to 40 minutes apart, and the highest may occur several hours after the first wave. Sometimes the first noticeable part of the wave is the trough which causes a recession of the water from shore, and people who have gone out to investigate this unusual exposure of the beach have been engulfed by the oncoming crest. Such an unexplained withdrawal of the sea should be considered as nature's warning of an approaching wave.

(606) Improvements have been made in the quick determination and reporting of earthquake epicenters, but no method has yet been perfected for determining whether a sea wave will result from a given earthquake. The Pacific Tsunami Warning Center, Oahu, Hawaii, of the National Oceanic and Atmospheric Administration is headquarters of a warning system which has field reporting stations (seismic and tidal) in most countries around the Pacific. When a warning is broadcast, waterfront areas should be vacated for higher ground, and ships in the vicinity of land should head for the deep water of the open sea.

(607) **Storm surge.**–A considerable rise or fall in the level of the sea along a particular coast may result from strong winds and sharp change in barometric pressure. In cases where the water level is raised, higher waves can form with greater depth and the combination can be destructive to low regions, particularly at high stages of tide. Extreme low levels can result in depths which are considerably less than those shown on nautical charts. This type of wave occurs especially in coastal regions bordering on shallow waters which are subject to tropical storms.

(608) **Seiche** is a stationary vertical wave oscillation with a period varying from a few minutes to an hour or more, but somewhat less than the tidal periods. It is usually attributed to external forces such as strong winds, changes in barometric pressure, swells, or tsunamis disturbing the equilibrium of the watersurface. Seiche is found both in enclosed bodies of water and superimposed upon the tides of the open ocean. When the external forces cause a short-period horizontal oscillation on the water, it is called **surge.**

(609) The combined effect of seiche and surge sometimes makes it difficult to maintain a ship in its position alongside a pier even though the water may appear to be completely undisturbed, and heavy mooring lines have been parted repeatedly under such conditions. Pilots advise taut lines to reduce the effect of the surge.

## SPECIAL SIGNALS FOR CERTAIN VESSELS

(610) **Special signals for surveying vessels.**–National Oceanic and Atmospheric Administration (NOAA) vessels engaged in survey operations and limited in their ability to maneuver because of the work being performed (handling equipment over-the-side such as water sampling or conductivity-temperature-density (CTD) casts, towed gear, bottom samplers, etc., and divers working on, below or in proximity of the vessel) are required by Navigation Rules, International-Inland, Rule 27, to exhibit:

(611) (b)(i) three all-round lights in a vertical line where they can best be seen. The highest and lowest of these lights shall be red and the middle light shall be white;

(612) (ii) three shapes in a vertical line where they can best be seen. The highest and lowest of these shapes shall be balls and the middle one a diamond;

(613) (iii) when making way through the water, masthead lights, sidelights and a sternlight, in addition to the lights prescribed in subparagraph (b)(I); and

(614) (iv) when at anchor, in addition to the lights or shapes prescribed in subparagraphs(b)(I) and (ii) the light, lights or shapes prescribed in Rule 30, Anchored Vessels and Vessels Aground.

(615) The color of the above shapes is black.

(616) A NOAA vessel engaged in hydrographic survey operations (making way on a specific trackline while sounding the bottom) is not restricted in its ability to maneuver and therefore exhibits at night only those lights required for a power-driven vessel of its length.

(617) **Warning signals for Coast Guard vessels while handling or servicing aids to navigation** are the same as those prescribed for surveying vessels. (See Special signals for surveying vessels, this chapter.)

## MINECLEARING-CAUTION–ATTENTION IS CALLED TO THE FOLLOWING INSTRUCTIONS.

### Mineclearing Operations.

(618) (a) United States vessels engaged in mineclearing operations or exercises are hampered to a considerable extent in their maneuvering powers.

### Other Vessels Must Keep Clear of Mineclearance Vessels (COLREGS 1972).

(619) (b) With a view to indicating the nature of the work on which they are engaged, these vessels will show the signals hereinafter mentioned. For the public safety, all other vessels, whether steamers or sailing craft, must endeavor to keep out of the way of vessels displaying these signals and not approach them inside the distances mentioned herein, especially remembering that it is dangerous to pass between the vessels of a pair or group clearing together.

(620) (c) All vessels towing sweeps are to show:

(621) **BY DAY**.–A black ball at the fore mast and a black ball at the end of each fore yard.

(622) **BY NIGHT**.–All around green lights instead of the black balls, and in a similar manner.

(623) (d) Vessels or formations showing these signals are not to be approached nearer than 1,000 meters. Under no circumstances is a vessel to pass through a formation of mineclearance vessels.

(624) (e) Mineclearance vessels should be prepared to warn merchant vessels which persist in approaching too close by means of any of the appropriate signals from the International Code of Signals.

(625) (f) In fog, mist, falling snow, heavy rainstorms, or any other conditions similarly restricting visibility, whether by day or night, mineclearance vessels while towing sweeps when in the vicinity of other vessels will sound signals for a vessel towing (1 prolonged blast followed by 2 short blasts).

### Helicopters Conducting Mineclearance Operations.

(626) (g) The United States is increasingly employing helicopters to conduct mineclearance operations or exercises. When so engaged, helicopters, like vessels, are considerably hampered in their ability to maneuver. Accordingly, surface craft approaching helicopters engaged in mineclearance operations should take safety precautions similar to those described in (b) and (d) above with respect to mineclearance vessels.

(627) (h) Helicopters towing mineclearance gear and accompanying surface escorts, if any, will use all available means to warn approaching ships of the operations or exercises being conducted. Also, measures will be taken where practicable to mark or light the gear or objects being towed.

(628) (i) Mineclearance helicopters are equipped with a rotating beacon which has selectable red and amber modes. The amber mode is used during towing operations to notify/warn other vessels that the helicopter is towing. While towing, the helicopter's altitude varies from 15 to 95 meters above the water and speeds vary from 0 to 30 knots.

(629) (j) General descriptions and approximate dimensions for towed mineclearance gear currently being used in conjunction with helicopters are as follows:

(630) (1) Mechanical clearing gear consisting, in part, of large lengths of submerged cables and explosive cutters. The only items normally visible on the surface are three to five international orange floats, depending upon the quantity of gear in use, which generally define the dimensions of the tow. The maximum width is 100 meters and the maximum distance behind the helicopter is 600 meters.

(631) (2) Acoustical clearing device weighing approximately 70 pounds. This device is towed behind the helicopter on a 250-meter orange polypropylene tow cable. When dead in the water, the gear will rise to the surface, supported by a yellow float.

(632) (3) A hydrofoil platform containing equipment used for magnetic influence clearing. The platform is towed on the end of a 140-meter cable and trails electrodes in the water which extend 185 meters behind the platform. Very often, the aforementioned acoustical clearing device is towed in conjunction with this platform by attaching it to the end of one of the electrodes by a 30-meter polypropylene tow line. In this configuration, the total length of the tow is 215 and 350 meters, respectively, behind the hydrofoil platform and helicopter. Special care must be exercised when crossing astern of the hydrofoil platform as the towed

cable is barely visible, and the attached acoustic device is submerged just beneath the surface and is not visible to surface vessels.

(633) (k) Helicopters employed in mineclearing operations and their tows may function at night as well as day, and in various types of weather conditions. The major danger to any surface vessel is getting the various cables wrapped in its screws. Small craft also are subject to the risk of collision with the hydrofoil platform

(634) **Submarine Emergency Identification Signals and Hazard to Submarines.**–U.S. submarines are equipped with signal ejectors which may be used to launch identification signals, including emergency signals. Two general types of signals may be used: smoke floats and flares or stars. A combination signal which contains both smoke and flare of the same color may also be used. The smoke floats, which burn on the surface, produce a dense, colored smoke for a period of fifteen to forty-five seconds. The flares or stars are propelled to a height of three hundred to four hundred feet (90 to 120 meters) from which they descend by small parachute. The flares or stars burn for about twenty-five seconds. The color of the smoke or flare/star has the following meaning:

(635) (a) **GREEN OR BLACK**.–Used under training exercise conditions only to indicate that a torpedo has been fired or that the firing of a torpedo has been simulated.

(636) (b) **YELLOW**.–Indicates that submarine is about to come to periscope depth from below periscope depth. Surface craft terminate antisubmarine counter-attack and clear vicinity of submarine. Do not stop propellers.

(637) (c) **RED**.–Indicates an emergency condition within the submarine and that it will surface immediately, if possible. Surface ships clear the area and stand by to give assistance after the submarine has surfaced. In case of repeated red signals, or if the submarine fails to surface within reasonable time, she may be assumed to be disabled. Buoy the location, look for submarine buoy and attempt to establish sonar communications. Advise U.S. Naval authorities immediately.

(638) (d) **WHITE**.–Two white flares/smoke in succession indicates that the submarine is about to surface, usually from periscope depth (non-emergency surfacing procedure). Surface craft should clear the vicinity of the submarine.

(639) Submarine Marker Buoy consists of a cylindrically shaped object about 3 feet by 6 feet with connecting structure and is painted international orange. The buoy is a messenger buoy with a wire cable to the submarine; this cable acts as a downhaul line for a rescue chamber. The buoy may be accompanied by an oil slick release to attract attention. A submarine on the bottom in distress and unable to surface will, if possible, release this buoy. If an object of this description is sighted, it should be investigated and U.S. Naval Authorities advised immediately.

(640) Transmission of the International Distress Signal (SOS) will be made on the submarine's sonar gear independently or in conjunction with the red emergency signal as conditions permit. Submarines may employ any or all of the following additional means to attract attention and indicate their position while submerged:

(641) Release of dye marker.

(642) Release of air bubble.

(643) Ejection of oil.

(644) Pounding on the hull.

(645) United States destroyer-type vessels in international waters will, on occasion, stream a towed underwater object at various speeds engaged in naval maneuvers. All nations operating submarines are advised that this underwater object in the streamed condition constitutes a possible hazard to submerged submarines.

(646) **Vessels Constrained by their Draft.**–International Navigation Rules, Rule 28, states that a vessel constrained by her draft may, in addition to the lights prescribed for power-driven vessels in Rule 23, exhibit where they can best be seen three all-around red lights in a vertical line, or a cylinder.

## NAVIGATION RESTRICTIONS AND REQUIREMENTS

(647) **Traffic Separation Schemes (Traffic Lanes).**–To increase the safety of navigation, particularly in converging areas of high traffic density, routes incorporating traffic separation have been adopted by the IMO in certain areas of the world. In the interest of safe navigation, it is recommended that through traffic use these schemes, as far as circumstances permit, by day and by night and in all weather conditions.

(648) The International Maritime Organization (IMO) is recognized as the only international body responsible for establishing and recommending measures on an international level concerning ships' routing. In deciding whether or not to adopt or amend a traffic separation scheme, IMO will consider whether the scheme complies with the design criteria for traffic separation schemes and with the established methods of routing. IMO also considers whether the aids to navigation proposed will enable mariners to determine their position with sufficient accuracy to navigate the scheme in accordance with Rule 10 of the International Regulations for Preventing Collisions at Sea (72 COLREGS).

(649) General principles for navigation in Traffic Separation Schemes are as follows:

(650) 1. A ship navigating in or near a traffic separation scheme adopted by IMO shall in particular comply with Rule 10 of the 72 COLREGS to minimize the development of risk of collisions with another ship. The other rules of the 72 COLREGS apply in all respects, and particularly the steering and sailing rules if risk of collision with another ship is deemed to exist.

(651) 2. Traffic separation schemes are intended for use by day and by night in all weather, ice-free waters or under light ice conditions where no extraordinary maneuvers or assistance by icebreaker(s) is required.

(652) 3. Traffic separation schemes are recommended for use by all ships unless stated otherwise. Bearing in mind the need for adequate underkeel clearance, a decision to use a traffic separation scheme must take into account the charted depth, the possibility of changes in the sea-bed since the time of last survey, and the effects of meteorological and tidal conditions on water depths.

(653) 4. A deep water route is an allied routing measure primarily intended for use by ships which require the use of such a route because of their draft in relation to the available depth of water in the area concerned. Through traffic to which the above consideration does not apply should, if practicable, avoid following deep water routes. When using a deep water route mariners should be aware of possible changes in the indicated depth of water due to meteorological or other effects.

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(654) 5. The arrows printed on charts merely indicate the general direction of traffic; ships should not set their courses strictly along the arrows.

(655) 6. Vessels should, so far as practicable, keep clear of a traffic separation line or separation zone.

(656) 7. Vessels should avoid anchoring in a traffic separation scheme or in the area near its termination.

(657) 8. The signal "YG" meaning "You appear not to be complying with the traffic separation scheme" is provided in the International Code of Signals for appropriate use.

(658) **Note**.–Several governments administering Traffic Separation Schemes have expressed their concern to IMO about the large number of infringements of Rule 10 of the 72 COLREGS and the dangers of such contraventions to personnel, vessels and environment. Several governments have initiated surveillance of traffic separation schemes for which they are responsible and are providing documented reports of vessel violations to flag states. As in the past, the U.S. Coast Guard will investigate these reports and take appropriate action. Mariners are urged to comply at all times with the 72 COLREGS and, in particular, Rule 10 when operating in or near Traffic Separation Schemes.

(659) 9. Notice of temporary adjustments to traffic separation schemes for emergencies or for accommodation of activities which would otherwise contravene Rule 10 or obstruct navigation may be made in Notices to Mariners. Temporary adjustments may be in the form of a precautionary area within a traffic lane, or a shift in the location of a lane.

(660) 10. The IMO approved routing measures which affect shipping in or near U.S. waters are:

(661) **TRAFFIC SEPARATION SCHEMES**

(662) In the Approaches to Portland, Maine

(663) In the Approaches to Boston, Massachusetts

(664) In the Approaches to Narragansett Bay, Rhode Island and Buzzards Bay, Massachusetts

(665) Off New York

(666) Off Delaware Bay

(667) In the Approaches to Chesapeake Bay

(668) In the Approaches to Galveston Bay

(669) Off San Francisco

(670) In the Santa Barbara Channel

(671) In the Approaches to Los Angeles-Long Beach

(672) In the Strait of Juan de Fuca

(673) In Puget Sound and its Approaches

(674) In Prince William Sound, Alaska

## MARINE POLLUTION

(675) **Oil Pollution–Compliance with the Clean Water Act**.–The Federal Water Pollution Control Act (FWPCA) prohibits the discharge of quantities of either oil or hazardous substance which may be harmful into or upon the navigable waters of the United States. This prohibition also applies to adjoining shorelines, waters of the contiguous zone, activities connected with the Outer Continental Shelf Lands Act (OSLA) and Deepwater Port Act of 1974, and such discharges which may affect natural resources belonging to the United States or under its exclusive management authority, including those resources under the Fishery Conservation and Management Act of 1976. Furthermore, in the event a spill does occur in violation of the Act the person in charge of a vessel or onshore or offshore facility is required to notify the Coast Guard as soon as he has knowledge of the spill. Such notification is to be by the most rapid means available to the National Response Center (1-800-424-8802, nationwide 24 hour number).

(676) **Compliance with the Act to Prevent Pollution from Ships**.–The Act to Prevent Pollution from ships (33 U.S.C. 1901) implements into U.S. law the International Convention for the Prevention of Pollution from Ships, as modified by the Protocol of 1978 (MARPOL 73/78). Annex I of MARPOL 73/78 deals with oil and oily waste, Annex II with hazardous chemicals and other substances referred to as Noxious Liquid Substances (NLS), and Annex V deals with the prevention of marine pollution by plastics and other garbage produced during vessel operations.

(677) Annex I of MARPOL 73/78 is applicable to oceangoing tankers over 150 gross tons and all other oceangoing ships over 400 gross tons. The MARPOL 73/78 requirements include oily waste discharge limitations, oily-water separating equipment, monitoring and alarm systems for discharges from cargo areas, cargo pump rooms and machinery space bilges. Ships to which Annex I MARPOL 73/78 is applicable are also required to have an International Oil Pollution Prevention (IOPP) Certificate verifying that the vessel is in compliance with the requirements of MARPOL 73/78 and that any required equipment is on board and operational. Vessels must also maintain an Oil Record Book recording all oil transfers and discharges. The Oil Record Book is available from USCG Supply Center Baltimore or any local Captain of the Port.

(678) Annex II of MARPOL 73/78 is applicable to oceangoing vessels and non-self propelled oceangoing ships which carry Noxious Liquid Substances (NLS) in bulk. The Annex II requirements include discharge restrictions for various classes of cargo residues; the maintenance of a Cargo Record Book for recording all NLS cargo and residue transfers and discharges; and a Procedures and Arrangements Manual describing the correct procedures for off loading and prewashing cargo tanks.

(679) Annex II NLS cargoes are classified in one of four categories, A,B,C, or D. Category A is the most hazardous to the environment. Category A and other substances which tend to solidify in tanks must be prewashed in port under the supervision of a Prewash Surveyor prior to departure from the off loading terminal. Vessel discharges must be underwater when discharge at sea is allowed. Tanks which carry Category B and C NLS must be tested to ensure that after tank stripping only a minimal amount of residues will remain. Reception facilities must be able to assist in cargo stripping operations by reducing back pressure during the final stages of off loading.

(680) Terminals and ports receiving oceangoing tankers, or any other oceangoing ships of 400 GT or more, carrying residues and mixtures containing oil, or receiving oceangoing ships carrying NLSs, are required to provide adequate reception facilities for the wastes generated. Coast Guard Captains of the Port issue a Certificate of Adequacy to terminals or ports to show that they are in compliance with federal reception facility requirements. An oceangoing tanker or any other oceangoing ship of 400 GT or more required to retain oil or oily residues and mixtures on board and an oceangoing ship carrying a Category A, B or C NLS cargo or NLS residue in cargo tanks that are required to be prewashed, may not enter any port or terminal unless the port or terminal holds a valid Certificate of Adequacy or unless the ship is entering under force majeure.

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(681) Annex V is applicable to all recreational, fishing, uninspected and inspected vessels, and foreign flag vessels on the navigable waters and all other waters subject to the jurisdiction of the United States, out to and including the Exclusive Economic Zone (200 miles).

(682) Annex V prohibits the disposal of any and all plastic material from any vessel anywhere in the marine environment. Dunnage, lining and packing materials which float may be disposed of beyond 25 miles from the nearest land. Other garbage that will not float may be disposed of beyond 12 miles of land, except that garbage which can pass through a 25mm mesh screen (approximately 1 square inch) may be disposed of beyond 3 miles. Dishwater is not to be considered garbage within the meaning of Annex V when it is the liquid residue from the manual or automatic washing of dishes or cooking utensils. More restrictive disposal regimes apply in waters designated "Special Areas." This Annex requires terminals to provide reception facilities at ports and terminals to receive plastics and other garbage from visiting vessels.

(683) The civil penalty for each violation of MARPOL 73/78 is not more than $25,000. The criminal penalty for a person who knowingly violates the MARPOL Protocol, or the regulations (**33 CFR 151, 155, 157, and 158**), consists of a fine of not more than $250,000 and/or imprisonment for not more than 5 years; U.S. law also provides criminal penalties up to $500,000 against organizations which violate MARPOL.

(684) **Packaged Marine Pollutants-Complying with MARPOL Annex III.**–On October 1, 1993, new regulations under the Hazardous Materials Transportation Act (HMTA) took effect, implementing MARPOL Annex III in the United States. MARPOL Annex III deals with the prevention of marine pollution by harmful substances in packaged form.

(685) Annex III of MARPOL 73/78 applies to all ships carrying harmful substances in packaged form. Annex III provides standards for stowage, packing, labeling, marking, and documentation of substances identified as marine pollutants in the International Maritime Dangerous Goods Code (IMDG Code). On 5 November 1992, the U.S. Research and Special Programs Administration (RSPA) amended the Hazardous Materials Regulations (HMR, 49 CFR 100-177) to list and regulate these marine pollutants in all modes of transportation. Under the HMR, marine pollutants are listed in a separate appendix, and a new "marine pollutant mark" will be required for those materials. The marine pollutant mark is used in addition to any existing labels or placards designating a hazardous substance.

(686) Marine pollutants are divided into two classes: marine pollutants and severe marine pollutants. A solution or mixture containing 10% or more of any marine pollutant falls into the class of "marine pollutant." The "severe marine pollutant" class consists of those materials that contain 1% or more of any specified "severe marine pollutant" substance. Marine pollutants that do not meet the criteria for any other hazard class are transported as an environmentally hazardous substance, solid or liquid, N.O.S. (class 9).

(687) **Pollution-Ocean Dumping.**–The Marine Protection Research and Sanctuaries Act of 1972, as amended (33 USC 1401 et seq.), regulates the dumping of all material, except fish waste, into ocean waters. Radiological, chemical and biological warfare agents and other high level radioactive wastes are expressly banned from ocean disposal. The U.S. Army Corps of Engineers issues permits for the disposal of dredged spoils; the Environmental Protection Agency is authorized to issue permits for all other dumping activities. Surveillance and enforcement to prevent unlawful transportation of material for dumping or unlawful dumping under the Act has been assigned to the U.S. Coast Guard. The Act provides civil penalties of up to $50,000 and criminal penalties of up to $50,000 and/or one year imprisonment.

(688) **Other requirements for the protection of navigable waters.**–It is not lawful to tie up or anchor vessels or to float lografts in navigable channels in such manner as to obstruct normal navigation. When a vessel or raft is wrecked and sunk in a navigable channel it is the duty of the owner to immediately mark it with a buoy or beacon during the day and a light at night until the sunken craft is removed or abandoned.

(689) **Obligation of deck officers.**–Licensed deck officers are required to acquaint themselves with the latest information published in Notice to Mariners regarding aids to navigation.

(690) **Improper use of searchlights prohibited.**–No person shall flash or cause to be flashed the rays of a searchlight or other blinding light onto the bridge or into the pilothouse of any vessel underway. The International Code Signal "PG2" may be made by a vessel inconvenienced by the glare of a searchlight in order to apprise the offending vessel of the fact.

(691) **Use of Radar.**–Navigation Rules, International-Inland, Rule 7, states, in part, that every vessel shall use all available means appropriate to the prevailing circumstances and conditions to determine if risk of collision exists. If there is any doubt such risk shall be deemed to exist. Proper use shall be made of radar equipment if fitted and operational, including long-range scanning to obtain early warning of risk of collision and radar plotting or equivalent systematic observation of detected objects.

(692) This rule places an additional responsibility on vessels which are equipped and manned to use radar to do so while underway during periods of reduced visibility without in any way relieving commanding officers of the responsibility of carrying out normal precautionary measures.

(693) Navigation Rules, International-Inland, Rules 6, 7, 8, and 19 apply to the use of radar.

(694) **Danger signal.**–Navigation Rules, International-Inland, Rule 34(d), states that when vessels in sight of one another are approaching each other and from any cause either vessel fails to understand the intentions or actions of the other, or is in doubt whether sufficient action is being taken by the other to avoid collision, the vessel in doubt shall immediately indicate such doubt by giving at least five short and rapid blasts on the whistle. Such signal may be supplemented by a light signal of at least five short and rapid flashes.

(695) **Narrow channels.**–Navigation Rules, International-Inland, Rule 9(b) states: A vessel of less than 65.6 feet (20 meters) in length or a sailing vessel shall not impede the passage of a vessel that can safety navigate only within a narrow channel or fairway.

(696) **Control of shipping in time of emergency or war.**–In time of war or national emergency, merchant vessels of the United States and those foreign flag vessels, which are considered under effective U.S. control, will be subject to control by agencies of the U.S. Government. The allocation and employment of such vessels, and of domestic port facilities, equipment, and services will be performed by appropriate agencies of the War Transport Administration. The movement, routing, and diversion of merchant ships at sea will be controlled by appropriate

naval commanders. The movement of merchant ships within domestic ports and dispersal anchorages will be coordinated by the U.S. Coast Guard. The commencement of naval control will be signaled by a general emergency message. (See NIMA Pub. 117 for emergency procedures and communication instructions.)

(697) **Exclusive Economic Zone of the United States.**–Established by a Presidential Proclamation on March 10, 1983, the Exclusive Economic Zone (**EEZ**) of the United States is a zone contiguous to the territorial sea, including zones contiguous to the territorial sea of the United States, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands (to the extent consistent with the Covenant and the United Nations Trusteeship Agreement), and United States overseas territories and possessions. The EEZ extends to a distance of 200 nautical miles from the baseline from which the breadth of the territorial sea is measured. In cases where the maritime boundary with a neighboring state remains to be determined, the boundary of the EEZ shall be determined by the United States and the other state concerned in accordance with equitable principles.

(698) Within the EEZ, the United States has asserted, to the extent permitted by international law, (a) sovereign rights for the purpose of exploring, exploiting, conserving and managing natural resources, both living and nonliving, of the seabed and subsoil and the superjacent waters and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy from the water, currents and winds; and (b) jurisdiction with regard to the establishment and use of artificial islands, and installations and structures having economic purposes, and the protection and preservation of the marine environment.

(699) Without prejudice to the sovereign rights and jurisdiction of the United States, the EEZ remains an area beyond the territory and territorial sea of the United States in which all states enjoy the high seas freedoms of navigation, overflight, the laying of submarine cables and pipelines, and other internationally lawful uses of the sea.

(700) This Proclamation does not change existing United States policies concerning the continental shelf, marine mammals and fisheries, including highly migratory species of tuna which are not subject to United States jurisdiction and require international agreements for effective management.

(701) The United States will exercise these sovereign rights and jurisdiction in accordance with the rules of international law.

(702) The seaward limit of the EEZ is shown on the nautical chart as a line interspersed periodically with EXCLUSIVE ECONOMIC ZONE. The EEZ boundary is coincidental with that of the Fishery Conservation Zone.

(703) **U.S. Fishery Conservation Zone.**–The United States exercises exclusive fishery management authority over all species of fish, except tuna, within the fishery conservation zone, whose seaward boundary is 200 miles from the baseline from which the U.S. territorial sea is measured; all anadromous species which spawn in the United States throughout their migratory range beyond the fishery conservation zone, except within a foreign country's equivalent fishery zone as recognized by the United States; all U.S. Continental Shelf fishery resources beyond the fishery conservation zone. Such resources include American lobster and species of coral, crab, abalone, conch, clam, and sponge, among others.

(704) No foreign vessel may fish, aid, or assist vessels at sea in the performance of any activity relating to fishing including, but not limited to preparation, supply, storage, refrigeration, transportation or processing, within the fishery conservation zone, or fish for anadromous species of the United States or Continental Shelf fishery resources without a permit issued in accordance with U.S. law. These permits may only be issued to vessels from countries recognizing the exclusive fishery management authority of the United States in an international agreement. The owners or operators of foreign vessels desiring to engage in fishing off U.S. coastal waters should ascertain their eligibility from their own flag state authorities. Failure to obtain a permit prior to fishing, or failure to comply with the conditions and restrictions established in the permit may subject both vessel and its owner or operators to administrative, civil, and criminal penalties. (Further details concerning foreign fishing are given in **50 CFR 611**.)

(705) Reports of foreign fishing activity within the fishery conservation zone should be made to the U.S. Coast Guard. Immediate reports are particularly desired, but later reports by any means also have value. Reports should include the activity observed, the position, and as much identifying information (name, number, homeport, type, flag, color, size, shape, etc.) about the foreign vessel as possible, and the reporting party's name and address or telephone number.

(706) **Bridge-to-bridge Radiotelephone Communication.**–Voice radio bridge-to-bridge communication between vessels is an effective aid in the prevention of collisions where there is restricted maneuvering room and/or visibility. VHF-FM radio is used for this purpose, due to its essentially line-of-sight characteristic and relative freedom from static. As VHF-FM has increasingly come into use for short-range communications in U.S. harbors and other high-traffic waters, so has the number of ships equipped with this gear increased.

(707) The Vessel Bridge-to-Bridge Radiotelephone Regulations, effective January 1, 1973, require vessels subject to the Act while navigating to be equipped with at least one single channel transceiver capable of transmitting and receiving on VHF-FM channel 13 (156.65 MHz), the Bridge-to-Bridge Radiotelephone frequency. Vessels with multichannel equipment are required to have an additional receiver so as to be able to guard VHF-FM channel 13 (156.65 MHz), the Bridge-to-Bridge Radiotelephone frequency, in addition to VHF-FM channel 16 (156.80 MHz), the National Distress, Safety and Calling frequency required by Federal Communications Commission regulations. (See **26.01 through 26.10,** chapter 2, for Vessel Bridge-to-Bridge Radiotelephone Regulations.)

(708) Mariners are reminded that the use of bridge-to-bridge voice communications in no way alters the obligation to comply with the provisions of the Navigation Rules, International-Inland.

(709) **VHF-FM Radiotelephone.**–VHF-FM channel 16 (156.800 MHz) is the international distress, urgency, safety, calling and reply frequency for vessels and public and private coastal stations. In 1992, the Federal Communications Commission (FCC) designated VHF-FM channel 9 (156.450 MHz) for use as a general purpose calling frequency for non-commercial vessels, such as recreational boats. This move was designed to relieve congestion on VHF-FM channel 16. Non-commercial vessels are encouraged to use VHF-FM channel 9, for routine communications but

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distress, urgency, and safety calls should continue to be initially made on VHF-FM channel 16.

(710) The following table provides the frequency equivalents and general usage of selected VHF-FM channels which appear in the Coast Pilot. The letter "A" appended to a channel number indicates that U.S. operation of the particular channel is different than the international operation, i.e., U.S. stations transmit and receive on the same frequency and international stations use different frequencies.

(711) The information given here is extracted from the "Maritime Radio Users Handbook" published by the Radio Technical Commission for Maritime Services. Ordering information for this valuable, comprehensive publication is included in the appendix, and located on the U.S. Coast Guard website (http://www.navcen.uscg.mil/marcomms/vhf.htm).

(712) All channels given below are designated for both ship-to-ship and ship-to-coast communications except as noted.

| VHF Channel | Ship Frequency (MHz) | | Channel Usage |
|---|---|---|---|
| | Transmit | Receive | |
| 1A | 156.050 | 156.050 | Port Operations and Commercial, VTS. (see footnote 2) |
| 5A | 156.250 | 156.250 | Port Operations or VTS (see footnote 1) |
| 6 | 156.300 | 156.300 | Intership Safety |
| 7A | 156.350 | 156.350 | Commercial |
| 8 | 156.400 | 156.400 | Commercial (Intership only) |
| 9 | 156.450 | 156.450 | Boater Calling. Commercial and Non-Commercial |
| 10 | 156.500 | 156.500 | Commercial |
| 11 | 156.550 | 156.550 | Commercial. VTS in selected areas. |
| 12 | 156.600 | 156.600 | Port Operations. VTS in selected areas. |
| 13 | 156.650 | 156.650 | Intership Navigation Safety (Bridge-to-bridge). (see footnote 4) |
| 14 | 156.700 | 156.700 | Port Operations. VTS in selected areas. |
| 15 | ---------- | 156.750 | Environmental (Receive only). Used by Class C EPIRBs. |
| 16 | 156.800 | 156.800 | International Distress, Safety and Calling. (See footnote 5) |
| 17 | 156.850 | 156.850 | State Control |
| 18A | 156.900 | 156.900 | Commercial |
| 19A | 156.950 | 156.950 | Commercial |
| 20 | 157.000 | 161.600 | Port Operations (duplex) |
| 20A | 157.000 | 157.000 | Port Operations |
| 21A | 157.050 | 157.050 | U.S. Coast Guard only |
| 22A | 157.100 | 157.100 | Coast Guard Liaison/Maritime Safety Information Broadcasts. (Channel 16) |
| 23A | 157.150 | 157.150 | U.S. Coast Guard only |
| 24 | 157.200 | 161.800 | Public Correspondence (Marine Operator) |
| 25 | 157.250 | 161.850 | Public Correspondence (Marine Operator) |
| 26 | 157.300 | 161.900 | Public Correspondence (Marine Operator) |
| 27 | 157.350 | 161.950 | Public Correspondence (Marine Operator) |
| 28 | 157.400 | 162.000 | Public Correspondence (Marine Operator) |
| 63A | 156.175 | 156.175 | Port Operations and Commercial, VTS. (see footnote 2) |
| 65A | 156.275 | 156.275 | Port Operations |
| 66A | 156.325 | 156.325 | Port Operations |
| 67 | 156.375 | 156.375 | Commercial. (see footnote 3) |
| 68 | 156.425 | 156.425 | Non-Commercial |
| 69 | 156.475 | 156.475 | Non-Commercial |
| 70 | 156.525 | 156.525 | Digital Selective Calling (voice communications not allowed) |
| 71 | 156.575 | 156.575 | Non-Commercial |
| 72 | 156.625 | 156.625 | Non-Commercial (Intership only) |
| 73 | 156.675 | 156.675 | Port Operations |
| 74 | 156.725 | 156.725 | Port Operations |
| 77 | 156.875 | 156.875 | Port Operations (Intership only) |
| 78A | 156.925 | 156.925 | Non-Commercial |

| VHF Channel | Ship Frequency (MHz) | | Channel Usage |
|---|---|---|---|
| | Transmit | Receive | |
| 79A | 156.975 | 156.975 | Commercial. Non-Commercial in Great Lakes only |
| 80A | 157.025 | 157.025 | Commercial. Non-Commercial in Great Lakes only |
| 81A | 157.075 | 157.075 | U.S. Government only-Environmental protection operations |
| 82A | 157.125 | 157.125 | U.S. Government only |
| 83A | 157.175 | 157.175 | U.S. Coast Guard only |
| 84 | 157.225 | 161.825 | Public Correspondence (Marine Operator) |
| 85 | 157.275 | 161.875 | Public Correspondence (Marine Operator) |
| 86 | 157.325 | 161.925 | Public Correspondence (Marine Operator) |
| 87 | 157.375 | 161.975 | Public Correspondence (Marine Operator) |
| 88 | 157.425 | 162.025 | Public Correspondence only near Canadian border. |
| 88A | 157.425 | 157.425 | Commercial, Intership only. |

**Footnotes to table:**

1. Houston, New Orleans and Seattle areas.
2. Available only in New Orleans/Lower Mississippi area.
3. Used for bridge-to-bridge communications in Lower Mississippi River. Intership only.
4. Ships >20m in length maintain a listening watch on this channel in US waters.
5. Ships required to carry radio, USCG, and most coast stations maintain a listening watch on this channel.