

NAVIGATIONAL WARNINGS AND SAFETY AT SEA

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BROADCAST WARNINGS - THE BEGINNING

On August 19, 1907, the U.S. Navy Hydrographic Center broadcast its first navigation warning to ships at sea. At the time there was neither a schedule for broadcasting navigational warnings nor a worldwide navigation safety system for shipping.

Information concerning navigation safety was difficult to obtain in a timely manner due to the limitations of maritime communications equipment available at that time and the lack of international coordination. Vessels were communicating with each other via wireless telegraph. The typical wireless telegraph had a range of only about 250 miles, depending on the age and power of the transmitter. Radios were new, unreliable and very fragile; they were not on board most vessels at the time. When a ship's officer received a wireless request for assistance from another vessel, he would go to its aid, but the lack of international coordination concerning maritime safety was still a problem. One incident would cause the entire world to begin to focus on the problems of safety at sea.

On April 14, 1912, the "unsinkable" passenger liner S.S. *Titanic* was crossing the North Atlantic Ocean at record-breaking speed on her maiden voyage from England to the United States. The *Titanic* received a wireless message from the S.S. *Amerika*, advising the *Titanic* of the existence of two icebergs ahead. The *Titanic* relayed the telegraph message to Defense Mapping Agency's (DMA) predecessor, the U.S. Hydrographic Office in Washington D.C., via the telegraph station at Cape Race, Newfoundland. At 11:45 PM that night, the *Titanic* struck one of the icebergs. About two hours later the *Titanic* sank. Because her owners considered her unsinkable, there were only enough lifeboats for about one third of the people on board. The S.S. *California* was lying only ten miles away, waiting for daylight before entering the ice fields. It could be seen by passengers and crew on the *Titanic*. Because the Wireless Officer on the *California* was off duty, no one on board heard the wireless distress call from the *Titanic*. The crew of the S.S. *Carpathia* heard the distress call and responded to it immediately. The *Carpathia's* Wireless Officer was also off duty but he was still in the wireless room. Because she was far away, the *Carpathia* did not arrive on the scene until about 5:00 AM. The *Carpathia* recovered all of the survivors from the *Titanic* lifeboats. The *Titanic* went down with more than 1500 people still on board. The telegram reporting the icebergs arrived at the Hydrographic Office later that day. The whole world had suddenly become interested in safety at sea.

SAFETY OF LIFE AT SEA (SOLAS)

The following year, an international group met and formed SOLAS, the Safety Of Life At Sea Convention. It was determined that there should be lifeboat space for everyone on board a vessel, and that vessels at sea should maintain a 24 hour radio watch. This group still meets and discusses international safety issues.

SOLAS established the International Ice Patrol to monitor ice conditions in the vicinity of the Grand Banks and report the location of any icebergs to mariners. After the

first year, the U.S. Coast Guard assumed control of the operation - it still patrols the area and promulgates ice messages during the ice season, though it now uses aircraft instead of ships to conduct the patrols. Computers run programs that calculate probable tracklines of known icebergs.

As technology advanced, the quality of shipboard communications equipment improved and radios replaced the wireless telegraph as standard equipment on board vessels throughout the world.

BROADCAST WARNING SERVICE BEGINS

The Navigation Safety Broadcast Service (commonly referred to as the "Watch Desk") provided by DMA today was established by the Hydrographic Office in 1921. It was staffed twenty four hours a day during World War II. After the war the Service was staffed sixteen hours a day. On February 1, 1990, the Watch Desk went back to continuous service and has since been operational around the clock.

When the Hydrographic Office Navigation Safety Broadcast Service started, all messages were broadcast as either HYDROLANTs or HYDROPACs. This service offered worldwide coverage of navigational warnings for all commercial and military shipping.

HYDROLANTs covered the North Atlantic Ocean, South Atlantic Ocean, North Sea, Baltic Sea, English Channel, Mediterranean Sea and adjoining areas.

HYDROPACs covered the North Pacific Ocean, South Pacific Ocean, South China Sea, Indian Ocean, Red Sea, Persian Gulf and adjoining areas.

In 1946, the Hydrographic Office relocated from Washington, D.C. to Suitland, Maryland. In 1962, the U.S. Hydrographic Office changed its name and became the U.S. Naval Oceanographic Office. On July 1, 1972, the mapping and charting functions of the Army, Navy and Air Force consolidated and became DMA. The responsibilities and functions of the Navigation Safety Broadcast Service came under the administration of DMA's Hydrographic Center (DMAHC) and remained in the same location at the Suitland, Maryland Federal Center. On September 18, 1978, the Hydrographic Center (HC), with its Navigation Safety Broadcast Service and charting functions, merged with the Topographic Center (TC) and became the Defense Mapping Agency Hydrographic/Topographic Center (DMAHTC). This merger included relocating the entire Hydrographic Center to the site of the Topographic Center in Bethesda, Maryland.

On June 30, 1995, a reorganization of the Defense Mapping Agency took place and the Hydrographic/Topographic Center was dissolved. The Navigation Safety Broadcast Service is still operational at the same location, but is now solely under the administrative control of DMA.

WORLDWIDE NAVIGATIONAL WARNING SERVICE

On January 1, 1977, the Worldwide Navigational Warning Service (WWNWS) was established through the joint efforts of the International Hydrographic Organization (IHO) and the Inter-governmental Maritime Consultative Organization (IMCO - now known as the International Maritime Organization, IMO). This service is an internationally coordinated broadcast service for the promulgation of information on worldwide hazards to navigation for international shipping.

WWNWS divides the world into sixteen NAVAREAS (see Figure 1). The United States participates as Area Coordinator for both NAVAREA IV, which covers the Western North Atlantic, and NAVAREA XII, which covers the Eastern North Pacific. DMA is the international

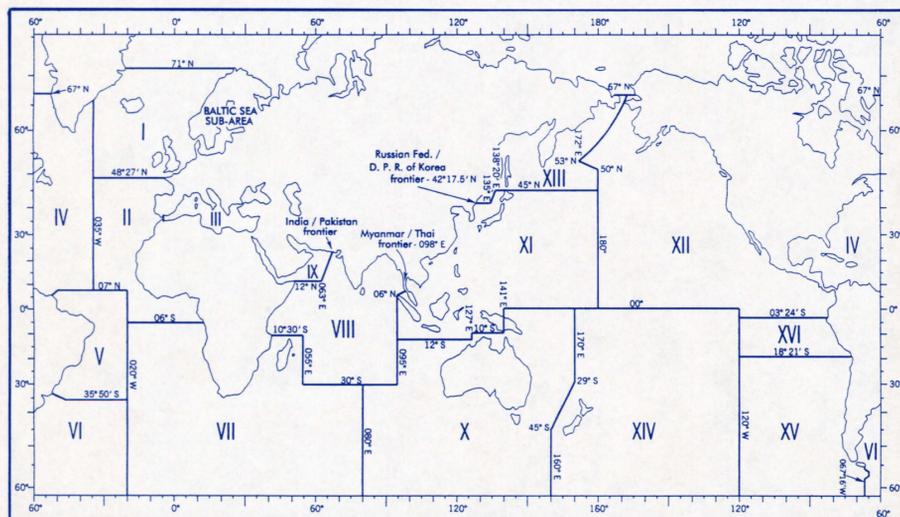


FIG. 1. WORLDWIDE NAVIGATIONAL WARNING SERVICE (WWNWS) NAVAREAS.



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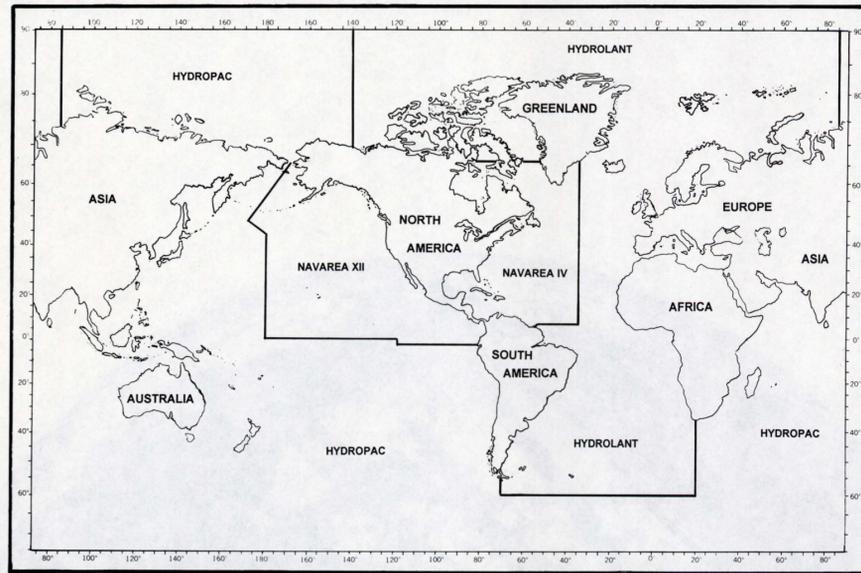


FIG. 2. UNITED STATES NAVIGATIONAL WARNING SYSTEMS.

coordinator for NAVAREAS IV and XII - the United States Coast Guard is the U.S. National Coordinator. The Coast Guard has the responsibility to broadcast coastal and local warnings for the East, Gulf and West coasts of the United States.

In addition to broadcasting navigational warnings for international shipping in NAVAREA IV and NAVAREA XII, the Watch Desk at DMA still promulgates HYDROLANT and HYDROPAC warnings (outside NAVAREA IV and XII coverage) for United States shipping. This gives U.S. military and U.S. flag commercial shipping the option of having worldwide coverage for broadcast navigational warnings from U.S. sources (see Figure 2).

NAVIGATIONAL WARNING MESSAGE CONTENT

Broadcast warnings promulgated by the Watch Desk at DMA will normally contain information concerning one or more of the following situations:

- Casualties to major and outermost aids to navigation such as primary lights, lightships, large navigational buoys (LNBs), approach or sea buoys. Mariners should monitor local broadcasts for information concerning inshore, harbor and inland waterways, and aids that otherwise may not affect offshore navigation.
- Establishment of new aids that could affect the safety of offshore navigation; alterations of an established aid where the change might be confusing are also promulgated.
- Floating dangers, such as those drifting in or near sealanes, and large derelicts adrift on the high seas. Following the end of the ice season, all reports of ice below 52° North that endanger the North Atlantic shipping lanes are also broadcast. Trees, timbers, and drifting buoys do not normally constitute a danger for oceangoing vessels and are not broadcast on the long-range systems. They may be promulgated in local broadcasts.
- New or amended shoal depths, or other changes in hydrography.
- Dangerous wrecks and obstructions.
- Marine, air or submarine distress, and searches for survivors. Reports of overdue vessels and aircraft are also normally broadcast.
- Selected exercises and hazardous operations conducted by units of the armed forces are normally broadcast. Specifically, these include the use of flares, searchlights or pyrotechnics that may be mistaken for distress signals, night firing exercises, darken-ship exercises, missile launches, and space mission launches.
- Information regarding drifting mines and unexploded ordnance at depths of less than 100 fathoms is broadcast when there is a clear danger to shipping.
- Vessels engaged in seismic operations, which often detonate explosives and tow extremely long cables.
- Malfunctions, scheduled off-air time for maintenance, and other information concerning electronic aids to navigation including marine radiobeacons, LORAN-C, OMEGA, and satellite navigation systems.
- The presence of large unwieldy tows in congested waters.
- Notification of special changes or events such as the alteration or suspension of mandatory traffic separation schemes or activation of a new buoyage system.

Navigation safety messages are canceled when no longer applicable. Messages are always canceled by specific notification in a message. A message pertaining to an exercise or event of known duration includes its own cancellation, usually one hour after conclusion of the event. Warnings that are sufficiently permanent in nature to warrant promulgation as a Notice to Mariners correction are canceled six weeks after publication of that printed notice.

NAVIGATIONAL WARNINGS VIA SATELLITE

The Global Maritime Distress and Safety System (GMDSS) is an automated ship-to-ship, shore-to-ship and ship-to-shore system covering distress alerting and relay, promulgation of maritime safety information (MSI), and basic communication links.

GMDSS represents a significant improvement in marine safety over the previous system of short range and high seas radio transmissions. Operational service of the GMDSS began on February 1, 1992, with full implementation targeted for February 1, 1999.

The International Maritime Satellite Organization (INMARSAT) is a key player within GMDSS. It is a consortium composed of over 75 international partners who provide maritime safety communications for ships at sea.

GMDSS INMARSAT SATELLITES

AOR-E	Atlantic Ocean Region-East
AOR-W	Atlantic Ocean Region-West
POR	Pacific Ocean Region
IOR	Indian Ocean Region

SafetyNET is a service of the INMARSAT Enhanced Group Call (EGC) System. The EGC system is a method used to specifically address messages to particular regions or ships. Its unique addressing capabilities allow messages to be sent to all vessels in fixed geographical areas or to predetermined groups of ships. SafetyNET is the IMO-designated service through which ships receive MSI messages via INMARSAT C terminals.

The Watch Desk at DMA now supplements the High Frequency (HF) broadcast with the INMARSAT SafetyNET Service to promulgate navigational warnings for NAVAREA IV and NAVAREA XII via satellite. Distress messages are sent out immediately upon receipt. Nondistress messages are sent out on the regular scheduled WWNWS SafetyNET Service. NAVAREA IV satellite messages are sent out at 1000Z and 2200Z daily via the AOR-W Satellite. NAVAREA XII satellite messages are sent out at 1030Z and 2230Z daily via the POR Satellite.

The Watch Desk will continue to send out long range warnings via HF broadcast until GMDSS becomes fully operational in 1999. The procedure for sending out DMA navigational warnings via HF broadcast has not changed with the implementation of GMDSS. To obtain

more information on GMDSS and INMARSAT SafetyNET Service, refer to the latest edition of DMA Pub 117 RADIO NAVIGATIONAL AIDS.

NAVTEX

NAVTEX, also a part of the GMDSS, is a maritime radio warning system consisting of a series of coast stations transmitting radioteletype safety messages on the international standard Medium Frequency (MF) 518 kHz. The United States Coast Guard maintains operational control of NAVTEX stations in U.S. coastal waters.

NAVTEX coast stations transmit during preset time slots so as to minimize interference with each other. 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 MF band, a typical station service radius ranges from 100 to 500 nautical miles day and night. Interference or reception from stations farther away occasionally occurs at night.

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 shipboard receiver to screen messages, selecting only those stations relevant to the user, and not printing out messages previously received. Selected messages are printed on a roll of paper as received, to be read by the mariner at his or her convenience. Unwanted messages are suppressed. Suppression of unwanted messages is becoming more important to the mariner as the number of messages, including rebroadcasts, increases annually.

Vessels regulated by the 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 August 1, 1993. The U.S. Coast Guard discontinued broadcasts of safety information over MF Morse Code on that date.

The U.S. Coast Guard voice broadcasts (channel 22A), often containing inshore and harbor information, remain unaffected by NAVTEX. With NAVTEX, mariners who did not have the knowledge of Morse Code necessary to receive safety messages, or who had difficulty receiving them on a timely basis, should have found a significant advantage in having a NAVTEX receiver. Mariners who were unable to staff a radio watch on a 24-hour-a-day basis should have also seen an advantage in having a NAVTEX receiver.

NAVTEX coverage is reasonably continuous to 200 nautical miles off the U.S. East, Gulf and West Coasts; Puerto Rico; Southwest Alaska; Hawaii; (see Figure 3) and 300 to 400 nautical miles off Guam.

For a complete list of U.S. Coast Guard NAVTEX stations in operation, their broadcast schedules, and more information on the worldwide implementation of NAVTEX, refer to the latest edition of DMA Pub 117 RADIO NAVIGATIONAL AIDS.

DMA does not promulgate navigation safety warnings falling within U.S. waters if the information is completely contained in NAVTEX coverage areas. The U.S.

Coast Guard covers those situations with NAVTEX Broadcasts.

Safety warnings which overlap coverage areas will be promulgated as both a NAVTEX message and a NAVAREA message, with the NAVAREA message promulgated by both HF broadcast and satellite. Otherwise, message duplication is minimized whenever possible.

SPECIAL WARNINGS

When the United States Government becomes aware of any international political situation with the potential for a possible hazardous condition for U.S. shipping, DMA is called upon to release a Special Warning.

Consultation between the Department of State, Maritime Administration, Chief of Naval Operations, Defense Mapping Agency, and any of several other government organizations determines the content and wording of the Special Warning.

With a final approval for release from the Department of State, DMA promulgates the Special Warning through its broadcast warning system for U.S. shipping, Government agencies and military commands worldwide. The Special Warning is sent to all WWNWS NAVAREA Coordinators and U.S. Coast Guard Districts for dissemination and is rebroadcast by DMA every Friday for five weeks.

U.S. flag merchant vessels in the vicinity of the affected area are required to acknowledge receipt of the Special Warning to the U.S. Coast Guard through an Automated Mutual-Assisted Vessel Rescue System (AMVER) report.

CONCLUSION

With local navigation warning coverage of NAVTEX by MF broadcast, HYDROLANTs and HYDROPACs by HF broadcast and NAVAREA IVs/XIIs by both the HF broadcast and via satellite (SafetyNET), the U.S. Coast Guard and the Defense Mapping Agency use the latest technology available to release messages concerning safety of life at sea.

To maintain a successful worldwide navigational warning system, DMA must receive up-to-date information concerning hazards to navigation from as many sources as possible, then promulgate timely warnings for worldwide shipping.

In some underdeveloped parts of the world, the coastal countries lack the facilities to broadcast navigation warnings for adjacent waters. Hazardous situations may exist and go unreported unless a passing vessel's crew takes notice and makes a report to one of the WWNWS NAVAREA Coordinators. DMA continuously needs to receive this type of information from these areas.

To ensure the continued success of the Worldwide Navigational Warning Service, mariners should continue to make reports on observations made concerning the safety of life at sea. For more detailed information concerning any of the systems in this article, or for details on how to contact any of the NAVAREA Coordinators, refer to the latest edition of DMA Pub 117 RADIO NAVIGATIONAL AIDS.

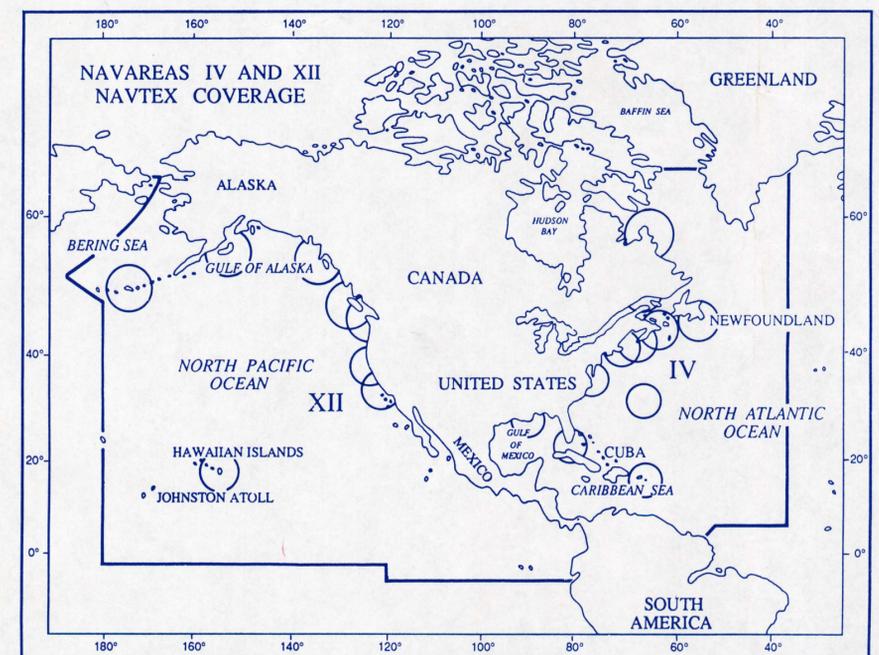


FIG. 3. NAVTEX COVERAGE FOR NAVAREA IV AND NAVAREA XII.