CHAPTER 30

MARITIME SAFETY SYSTEMS

MARITIME SAFETY AND THE NAVIGATOR

3000. Introduction

The navigator's chief responsibility is the safety of the vessel and its crew. Fulfilling this duty consists mostly of ascertaining the ship's position and directing its course to avoid dangers. But accidents can happen to the most cautious, and the most prudent of navigators may experience an emergency which requires outside assistance. Distress incidents at sea are more likely to be resolved without loss of vessel and life if they are reported immediately. The more information that rescue authorities have, and the sooner they have it, the more likely it is that the outcome of a distress at sea will be favorable.

Global distress communication systems, ship reporting systems, emergency radiobeacons, commercial ship tracking and other technologies have greatly enhanced mariners' safety. Therefore, it is critical that mariners understand the purpose, functions, and limitations of maritime safety systems as well as threats to maritime security.

The mariner's direct high-seas link to shoreside rescue authorities is the **Global Maritime Distress and Safety System (GMDSS),** which was developed to both simplify and improve the dependability of communications for all ships at sea. GMDSS nicely compliments the operation of the U.S. Coast Guard's AMVER system, which tracks participating ships worldwide and directs them as needed to distress incidents. GMDSS and AMVER rely on radiotelephone or satellite communications for passing information. But even with normal communications disabled, a properly equipped vessel has every prospect of rapid rescue or aid if it carries a SOLAS-required Emergency Position Indicating Radiobeacon (EPIRB) and a Search and Rescue radar Transponder (SART). These systems are the subject of this chapter.

GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM

3001. Introduction and Background

The Global Maritime Distress and Safety System (GMDSS) represents a significant improvement in maritime safety over the previous system of short range and high seas radio transmissions. Its many parts include satellite as well as advanced terrestrial communications systems. Operational service of the GMDSS began on February 1, 1992, with full implementation accomplished by February 1, 1999.

GMDSS was adopted in 1988 by amendments to the Conference of Contracting Governments to the **International Convention for the Safety of Life at Sea (SOLAS)**, 1974. This was the culmination of more than a decade of work by the International Maritime Organization (IMO) in conjunction with the International Telecommunications Union (ITU), International Hydrographic Organization (IHO), World Meteorological Organization (WMO), Inmarsat (International Maritime Satellite Organization), and others.

GMDSS offers the greatest advancement in maritime safety since the enactment of regulations following the Titanic disaster in 1912. It is an automated ship-to-ship, shore-to-ship and ship-to-shore communications system covering distress alerting and relay, the provision of **maritime safety information (MSI)**, and routine communications. Satellite and advanced terrestrial systems are incorporated into a communications network to promote and improve safety of life and property at sea throughout the world. The equipment required on board ships depends on their tonnage and the area in which the vessel operates. This is fundamentally different from the previous system, which based requirements on vessel size alone. The greatest benefit of the GMDSS is that it vastly reduces the chances of ships sinking without a trace, and enables **search and rescue (SAR)** operations to be launched without delay and directed to the exact site of a maritime disaster.

3002. Ship Carriage Requirements

By the terms of the SOLAS Convention, the GMDSS provisions apply to cargo ships of 300 gross tons and over and ships carrying passengers on international voyages. Unlike previous shipboard carriage regulations that specified equipment according to size of vessel, the GMDSS carriage requirements stipulate equipment according to the area in which the vessel operates (and vessel size in some cases). These sea areas are designated as follows:

Sea Area A1 An area within the radiotelephone coverage of at least one VHF coast station in which continuous Digital Selective Calling is available, as may be defined by a Contracting Government to the 1974 SOLAS Convention. This area extends from the coast to about 20 miles offshore.

Sea Area A2 An area, excluding sea area A1, within the radiotelephone coverage of at least one MF coast station in which continuous DSC alerting is available, as may be defined by a Contracting Government. The general area is from the A1 limit out to about 100 miles offshore.

Sea Area A3 An area, excluding sea areas A1 and A2, within the coverage of an Inmarsat geostationary satellite in which continuous alerting is available. This area is from about 70°N to 70°S.

Sea Area A4 All areas outside of sea areas A1, A2 and A3. This area includes the polar regions, where geostationary satellite coverage is not available.

Ships at sea *must* be capable of the following functional GMDSS requirements:

1. Ship-to-shore distress alerting, by at least two separate and independent means, each using a different radio communication service
2. Shore-to-ship distress alerting
3. Ship-to-ship distress alerting
4. SAR coordination
5. On-scene communications
6. Transmission and receipt of emergency locating signals
7. Transmission and receipt of MSI
8. General radio communications
9. Bridge-to-bridge communications

To meet the requirements of the functional areas above the following is a list of the minimum communications equipment needed for all ships:

1. VHF radio capable of transmitting and receiving DSC on channel 70, and radio telephony on channels 6, 13 and 16
2. Radio receiver capable of maintaining a continuous Digital Selective Calling (DSC) watch on channel 70 VHF
3. Search and rescue transponders (SART). Only one SART is required if the vessel is under 500 gross tons. Two SARTs are required if the vessel is over 500 tons and must be capable of operating in the 9 GHz band (AIS SART meets carriage requirements).
4. Receiver capable of receiving NAVTEX broadcasts anywhere within NAVTEX range
5. Receiver capable of receiving SafetyNET anywhere NAVTEX is not available
6. Satellite emergency position indicating radiobeacon (EPIRB), manually activated and float-free self-activated
7. Two-way handheld VHF radios (two sets minimum on 300-500 gross tons cargo vessels and three sets minimum on cargo vessels of 500 gross tons and upward and on all passenger ships)

Additionally, each sea area has its own requirements under GMDSS which are as follows:

Sea Area A1

1. General VHF radio telephone capability
2. Free-floating satellite EPIRB
3. Capability of initiating a distress alert from a navigational position using DSC on either VHF, HF or MF; manually activated EPIRB; or Ship Earth Station (SES)

Sea Areas A1 and A2

1. Radio telephone MF radiotelephony or direct printing 2182 kHz, and DSC on 2187.5 kHz
2. Equipment capable of maintaining a continuous DSC watch on 2187.5 kHz
3. General working radio communications in the MF band (1605-4000 kHz), or Inmarsat SES
4. Capability of initiating a distress alert by HF (using DSC), manual activation of an EPIRB, or Inmarsat SES

Sea Areas A1, A2 and A3

1. Radio telephone MF 2182 kHz and DSC 2187.5 kHz.
2. Equipment capable of maintaining a continuous DSC watch on 2187.5 kHz
3. Inmarsat-C (class 2) or Fleet 77 SES Enhanced Group Call (EGC), or HF as required for sea area A4
4. Capability of initiating a distress alert by two of the following:
   a. Inmarsat-C (class 2) or Fleet 77 SES
   b. Manually activated EPIRB
   c. HF/DSC radio communication

Sea Area A4

1. HF/MF receiving and transmitting equipment for band 1605-27500 kHz using DSC, radiotelephone and direct printing
2. Equipment capable of selecting any safety and distress DSC frequency for band 4000-27500 kHz,

maintaining DSC watch on 2187.5, 8414.5 kHz and at least one additional safety and distress DSC frequency in the band
3. Capability of initiating a distress alert from a navigational position via the Polar Orbiting System on 406 MHz (manual activation of 406 MHz satellite EPIRB)

3003. The Inmarsat System

Inmarsat (International Maritime Satellite Organization), a key player within GMDSS, is an international corporation comprising over 75 international partners providing maritime safety communications for ships at sea. Inmarsat provides the space segment necessary for improving distress communications, efficiency and management of ships, as well as public correspondence services.

The basic components of the Inmarsat system include the Inmarsat **space segment, Land Earth Stations (LES)**, also referred to as **Coast Earth Stations (CES)**, and mobile **Ship Earth Stations (SES)**.

The Inmarsat space segment consists of 11 geostationary satellites. Four operational Inmarsat satellites provide primary coverage, four additional satellites (including satellites leased from the European Space Agency (ESA) and the International Telecommunications Satellite Organization (INTELSAT)) serve as spares and three remaining leased satellites serve as back-ups.

The polar regions are not visible to the operational satellites but coverage is available from about 75°N to 75°S. Satellite coverage (Figure 3003) is divided into four overlapping regions:

1. Atlantic Ocean - East (AOR-E)
2. Atlantic Ocean - West (AOR-W)
3. Pacific Ocean (POR)
4. Indian Ocean (IOR)

The LES's provide the link between the Space Segment and the land-based national/international fixed communications networks. These communications networks are funded and operated by the authorized communications authorities of a participating nation. This network links registered information providers to the LES. The data then travels from the LES to the Inmarsat **Network Coordination Station (NCS)** and then down to the SES's on ships at sea. The SES's provide two-way communications between ship and shore. Fleet 77 service is digital and operates at up to 64kbps.

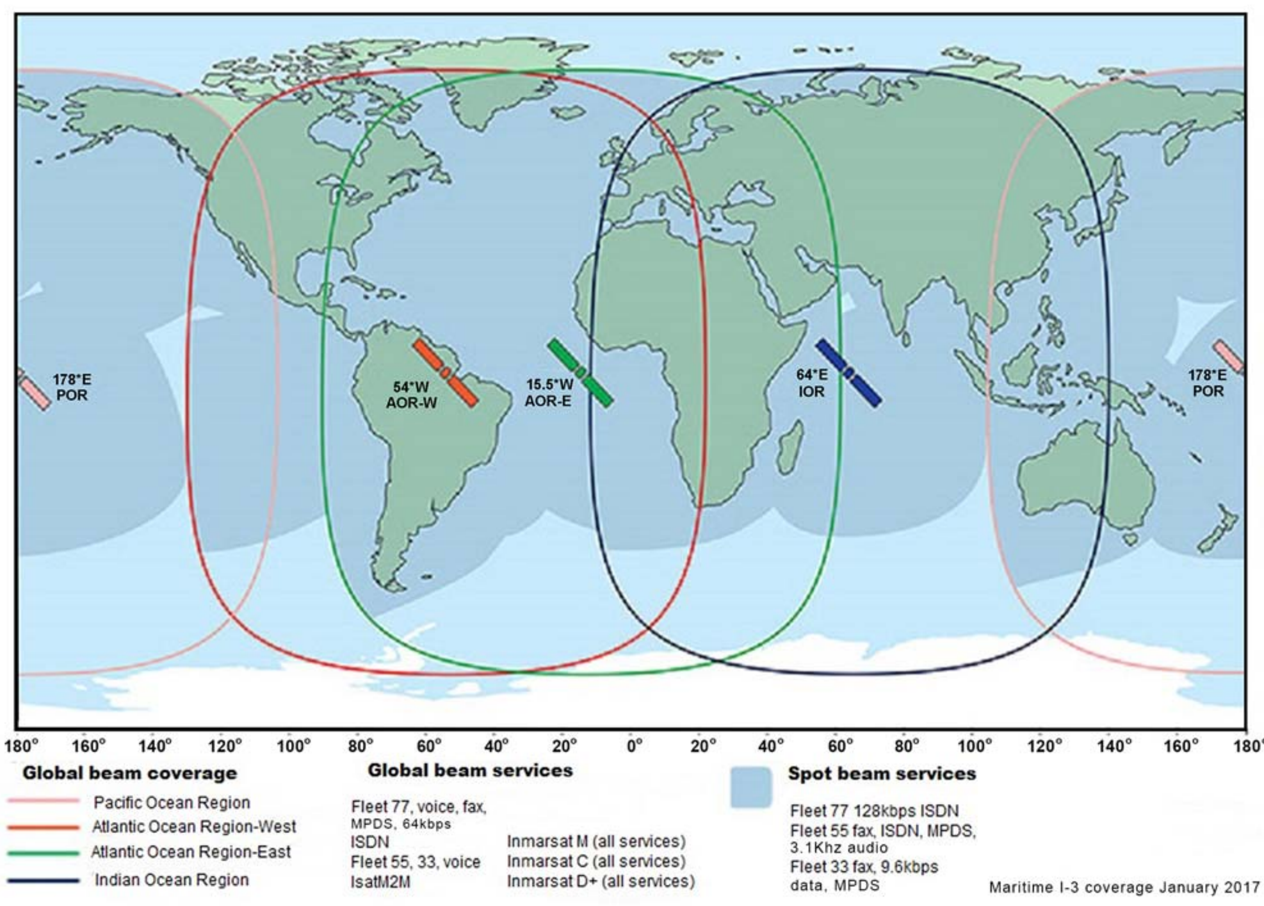

Figure 3003. The four regions of Inmarsat coverage.

Inmarsat-C provides a two-way **store and forward** data messaging capability (but no voice) at 600 bits per second and was designed specifically to meet the GMDSS requirements for receiving MSI data on board ship. These units are small, lightweight and use an omni-directional antenna.

3004. Maritime Safety Information (MSI)

Major categories of MSI for both NAVTEX and SafetyNET are:

1. Navigational warnings
2. Meteorological warnings
3. Ice reports
4. Search and rescue information
5. Meteorological forecasts
6. Pilot service messages (not in the U.S.)
7. Electronic navigation system messages (i.e., GPS, DGPS, etc.)

Broadcasts of MSI in NAVTEX international service are in English, but may be in languages other than English to meet requirements of the host government.

3005. SafetyNET

SafetyNET is a broadcast service of Inmarsat-C's **Enhanced Group Call (EGC)** system. The EGC system (Figure 3005a) is a method used to specifically address particular regions or groups of ships. Its unique addressing capabilities allow messages to be sent to all vessels in both fixed geographical areas or to predetermined groups of ships. SafetyNET is a service designated by the IMO through which ships receive maritime safety information. The other service under the EGC system, called **FleetNET**, is used by commercial companies to communicate directly and privately with their individual fleets.

SafetyNET is an international shore to ship satellite-based service for the promulgation of distress alerts, navigational warnings, meteorological warnings and forecasts, and other safety messages. It fulfills an integral role in GMDSS as developed by the IMO. The ability to receive SafetyNET messages is required for all SOLAS ships that sail beyond coverage of NAVTEX (approximately 200 miles from shore).

SafetyNET can direct a message to a given geographic area based on EGC addressing. The area may be fixed, as in the case of a NAVAREA or weather forecast area, or it may be uniquely defined by the originator. This is particularly useful for messages such as local storm warnings or focused shore to ship distress alerts.

SafetyNET messages can be originated by a **Registered Information Provider** anywhere in the world and broadcast to the appropriate ocean area through an Inmarsat-C LES. Messages are broadcast according to their priority (i.e. Distress, Urgent, Safety, and Routine).

Virtually all navigable waters of the world are covered by the operational satellites in the Inmarsat system. Each satellite broadcasts EGC traffic on a designated channel. Any ship sailing within the coverage area of an Inmarsat satellite will be able to receive all the SafetyNET messages broadcast over this channel. The EGC channel is optimized to enable the signal to be monitored by SES's dedicated to the reception of EGC messages. This capability can be built into other standard SES's. It is a feature of satellite communications that reception is not generally affected by the position of the ship within the ocean region, atmospheric conditions, or time of day.

Messages can be transmitted either to geographic areas (area calls) or to groups of ships (group calls):

1. **Area calls** can be to a fixed area such as one of the 16 NAVAREA's or to a temporary geographic area selected by the originator (circular or rectangular). Area calls will be received automatically by any ship whose receiver has been set to one or more fixed areas.
2. **Group calls** will be received automatically by any ship whose receiver acknowledges the unique group identity associated with a particular message.

Reliable delivery of messages is ensured by forward error correction techniques. Experience has demonstrated that the transmission link is generally error-free and low error reception is achieved under normal circumstances.

Given the vast ocean coverage by satellite, some form of discrimination and selectivity in printing the various messages is required. Area calls are received by all ships within the ocean region coverage of the satellite; however, they will be printed only by those receivers that recognize the fixed area or the geographic position in the message. The message format includes a **preamble** that enables the microprocessor in a ship's receiver to decide to print those MSI messages that relate to the present position, intended route or a fixed area programmed by the operator. This preamble also allows suppression of certain types of MSI that are not relevant to a particular ship. As each message will also have a unique identity, the reprinting of messages already received correctly is automatically suppressed.

MSI is promulgated by various information providers around the world. Messages for transmission through the SafetyNET service will, in many cases, be the result of coordination between authorities. Information providers will be authorized by IMO to broadcast via SafetyNET. Authorized information providers are:

1. National hydrographic offices for navigational warnings
2. National weather services for meteorological warnings and forecasts

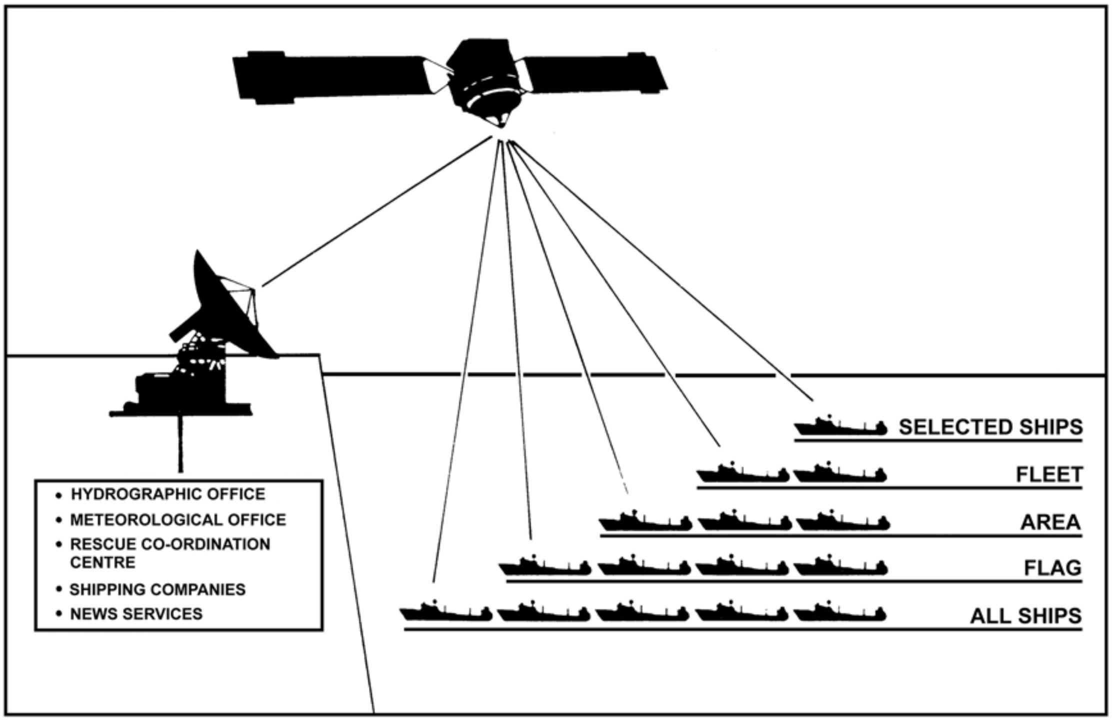

Figure 3005a. SafetyNET EGC concept.

3. Rescue Coordination Centers (RCC's) for ship-to-shore distress alerts and other urgent information
4. In the U.S., the International Ice Patrol (IIP) for North Atlantic ice hazards

Each information provider prepares their SafetyNET messages with certain characteristics recognized by the EGC service. These characteristics, known as "C" codes are combined into a generalized message header format as follows: C1:C2:C3:C4:C5. Each "C" code controls a different broadcast criterion and is assigned a numerical value according to available options. A sixth "C" code, "C0" may be used to indicate the ocean region (i.e., AOR-E, AOR-W, POR, IOR) when sending a message to an LES which operates in more than one ocean region. Because errors in the header format of a message may prevent its being broadcast, MSI providers must install an Inmarsat SafetyNET receiver to monitor the broadcasts it originates. This also ensures quality control.

The "C" codes are transparent to the mariner, but are used by information providers to identify various transmitting parameters. C1 designates the message priority, either distress to urgent, safety, or routine. MSI messages will always be at least at the safety level. C2 is the service code or type of message (for example, long range NAVAREA warning or coastal NAVTEX warning). It also tells the receiver the length of the address (the C3 code) it will need to decode. C3 is the address code. It can be the two-digit code for the NAVAREA number for instance, or a ten-digit number to indicate a circular area for a meteorological warning. C4 is the repetition code which instructs the LES when to send the message to the NCS for actual broadcast. A six minute echo (repeat) may also be used to ensure that an urgent (unscheduled) message has been received by all ships affected. C5 is a constant and represents a presentation code, International Alphabet number 5, "00".

Broadcasts of MSI in the international SafetyNET service must be in English, but may be supplemented by other languages to meet requirements of the host government.

The International SafetyNET Manual is available on-line via the link provided in Figure 3005b.

Figure 3005b. International SafetyNET Manual. https://www.iho.int/mtg_docs/com_wg/CPRNW/WWNWS1/WWNWS1-4-3-1.doc

3006. NAVTEX

NAVTEX is a maritime radio warning system consisting of a series of coast stations transmitting radio teletype (standard narrow-band direct printing, called **Sitor** for Simplex Telex Over Radio) safety messages on the internationally standard medium frequency of 518 kHz (490kHz local language). It is a GMDSS requirement for the reception of MSI in coastal and local waters. Coast stations transmit during previously arranged time slots to minimize mutual interference. Routine messages are normally broadcast four 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 to 500 NM day and night (although a 200 mile rule of thumb is applied in the U.S.). Interference from or receipt of stations further away occasionally occurs at night.

Each NAVTEX message broadcast contains a four-character header describing: identification of station (first character), message content or type (second character), and message serial number (third and fourth characters). This header allows the microprocessor in the shipboard receiver to screen messages from only those stations relevant to the user, messages of subject categories needed by the user and messages not previously received by the user. Messages so screened are printed as they are received, to be read by the mariner when convenient. All other messages are suppressed. Suppression of unwanted messages is becoming more and more a necessity to the mariner as the number of messages, including rebroadcast messages, increases yearly. With NAVTEX, a mariner will not find it necessary to listen to, or sift through, a large number of non-relevant data to obtain the information necessary for safe navigation.

The NAVTEX receiver is a small unit with an internal printer, which takes a minimum of room on the bridge. Its antenna is also of modest size, needing only a receive capability.

Valuable information regarding NAXTEX and navigational warnings can be found in *Pub No. 117 Radio Navigation Aids* via the link provided in Figure 3006.

Figure 3006. NGA- Radio Navigational Aids (Pub. No. 117). https://msi.nga.mil/NGAPortal/MSI.portal?_nfpb=true&_st=&_pageLabel=msi_portal_page_62&pubCode=0009

3007. Digital Selective Calling (DSC)

Digital Selective Calling (DSC) is a system of digitized radio communications which allows messages to be targeted to all stations or to specific stations, allows for unattended and automated receipt and storage of messages for later retrieval, and permits the printing of messages in hardcopy form. All DCS calls automatically include error-checking signals and the identity of the calling unit. Digital codes allow DSC stations to transmit and receive distress messages, transmit and receive acknowledgments of distress messages, relay distress messages, make urgent and safety calls, and initiate routine message traffic.

Each unit has a MAYDAY button which allows the instant transmittal of a distress message to all nearby ships and shore stations. The location of the distress will be automatically indicated if the unit is connected to a GPS receiver. Each unit must be registered with the Coast Guard and have unique identifier programmed into it. Distress alerts can be sent on only one or as many as six channels consecutively on some units.

Listening watch on 2182 kHz ended with implementation of GMDSS in 1999. When DSC has been implemented worldwide, the traditional listening watch on Channel 16 VHF will no longer be necessary. The introduction of DSC throughout the world is expected to take to take a number of years.

There are four basic types of DSC calls:

- Distress
- Urgent
- Safety
- Routine

Distress calls are immediately received by rescue authorities for action, and all vessels receiving a distress call are alerted by an audible signal.

Each DSC unit has a unique **Maritime Mobile Service Identity (MMSI)** code number, which is attached to all outgoing messages. The MMSI number is a nine-digit number to identify individual vessels, groups of vessels, and coast stations. Ship stations will have a leading number consisting of 3 digits which identify the country in which the ship is registered, followed by a unique identifying number for the vessel. A group of vessels will have a leading zero, followed by a unique number for that group. A coast station will have 2 leading zeros followed by a code number. Other codes may identify all stations, or all stations in a particular geographic area.

DSC frequencies are found in the VHF, MF and HF bands. Within each band except VHF, one frequency is allocated for distress, urgent, and safety messages. Other frequencies are reserved for routine calls. In the VHF band, only one channel is available, Channel 70 (156.525 MHz), which is used for all calls. In the MF band, 2187.5 kHz and 2189.5 kHz are reserved for distress/safety, and 2177 kHz for ship-to-ship. 2189.5 kHz (in conjunction with 2177 kHz) is for routine ship-to-shore calls.

3008. Using DSC

A distress call consists of a Format Specifier--Distress; the MMSI code; the nature of the distress (selected from a list: fire/explosion, flooding, collision, grounding, listing, sinking, disabled/adrift, or abandoning ship; defaults to Undesignated); the time of the call, and the format for subsequent communications (radiotelephone or NDBP). Once activated, a distress signal is repeated automatically every few minutes until an acknowledgment is received or the function is switched off. As soon as an acknowledgment is received by the vessel in distress, it must commence communications with an appropriate message by radiotelephone or NDBP according to the format:

"MAYDAY"
MMSI CODE NUMBER AND CALL SIGN
NAME OF VESSEL
POSITION
NATURE OF DISTRESS
TYPE OF ASSISTANCE NEEDED
OTHER INFORMATION

Routine calls should be made on a channel reserved for non-distress traffic. Once made, a call should not be repeated, since the receiving station either received the call and stored it, or did not receive it because it was not in service. At least 5 minutes should elapse between calls by vessels on the first attempt, then at 15 minute minimum intervals.

To initiate a routine ship to shore or ship to ship call to a specific station, the following procedures are typical (consult the operator's manual for the equipment for specific directions):

- Select the appropriate frequency
- Select or enter the MMSI number of the station to be called
- Select the category of the call
- Select subsequent communications method (R/T, NDBP)
- Select proposed working channel (coast stations will indicate vacant channel in acknowledgment)
- Select end-of-message signal (RQ for acknowledgment required)
- Press <CALL>

The digital code is broadcast. The receiving station may acknowledge receipt either manually or automatically, at which point the working channel can be agreed on and communications begin.

Watchkeeping using DSC consists of keeping the unit ON while in the appropriate Sea Area. DSC watch frequencies are VHF Channel 70, 2187.5 kHz, 8414.5 kHz, and one HF frequency selected according to the time of day and season. Coast stations maintaining a watch on DCS channels are listed in NGA *Pub. 117 Radio Navigational Aids* and other lists of radio stations.

3009. The Automated Mutual-Assistance Vessel Rescue System (AMVER)

AMVER is an international maritime mutual assistance program that coordinates search and rescue efforts around the world. It is voluntary, free of charge, and endorsed by the IMO. The AMVER system is discussed in detail in Chapter 31. The AMVER website can be accessed through the link provided in Figure 3009.

Figure 3009. AMVER website. www.amver.com

EMERGENCY POSITION INDICATING RADIOBEACONS (EPIRBS)

3010. Description and Capabilities

Emergency Position Indicating Radiobeacons (EPIRBs) are designed to save lives by automatically alerting rescue authorities and indicating the distress location. EPIRB types are described below (Table 3010a):

121.5/243 MHz EPIRBs (Class A, B, S): As of 1 January, 2007 the operation of 121.5 MHz EPIRBs has been prohibited in the United States. Satellite monitoring of the 121.5 MHz and 243.0 MHz frequencies was ceased 1 February, 2009.

All mariners using emergency beacons on either of these frequencies will need to upgrade to beacons operating on the newer, more reliable, 406 MHz digital EPIRBs in order to be detected by satellites.

406 MHz EPIRBs (Category I, II): The 406 MHz EPIRB was designed to operate with satellites. Its signal allows authorities to locate the EPIRB much more accurately than 121.5/243 MHz devices and identify the individual vessel anywhere in the world. There is no range limitation. These devices also include a 121.5 MHz homing signal, allowing aircraft and rescue vessels to quickly locate the vessel in distress once underway. These are the only type of EPIRB which must be tested by Coast Guard-approved independent laboratories before they can be sold for use in the United States.

An automatically activated, float-free version of this EPIRB has been required on SOLAS vessels (cargo ships over 300 tons and passenger ships on international voyages) since August 1, 1993. The Coast Guard requires U.S. commercial fishing vessels to carry this device, and requires the same for other U.S. commercial uninspected vessels which travel more than 3 miles offshore.

Owners of 406 MHz EPIRBs furnish registration information about their vessel, type of survival gear, and emergency points of contact ashore, all of which greatly enhance the quality of the response. The database for U.S. vessels is maintained by the National Oceanic and Atmospheric Administration, and is accessed worldwide by SAR authorities to facilitate SAR response.

Type	Frequency	Description
Category I	406 MHz	Float-free, automatically activated. Detectable by satellite anywhere in the world.
Category II	406 MHz	Similar to Category I, except manually activated.

Table 3010a. 406 MHz EPIRB classifications.

3011. Registering EPIRBs

EPIRB Registration data provides search and rescue authorities with contact and vessel information which they use solely to locate the user in an emergency. The data can cut down the time needed to confirm an EPIRB distress location or allow authorities to locate a vessel even in rare instances where the EPIRB location cannot be determined.

When registering ensure the EPIRBs 15-digit Unique Identification Number (UIN) is entered properly and validated with the EPIRBs checksum (if provided). The UIN is what links registration data to a specific EPIRB.

In the U.S. EPIRB registration is required by the Code of Federal Regulations in the US (Title 47, Part 80, Section 80.1061, Paragraph (f)). Failure to register can, in some instances, result in penalties and/or fines issued by the FCC.

EPIRBs can be registered with NOAA through one of the following methods:

- Register online at:

https://beaconregistration.noaa.gov/rgdb/

- Mail the original, signed registration form, available on the website or with your beacon literature, to NOAA at:

  NOAA
  SARSAT BEACON REGISTRATION
  NSOF, E/SPO53
  1315 East West Hwy
  Silver Spring, MD 20910

- Or, fax the signed form to NOAA at 301-817-4565.

If you have any questions or comments pertaining to beacon registration, please call 301-817-4515 or toll-free at 1-888-212-SAVE (7283), or you may email your question to the Beacon Registration Staff at:

beacon.registration@noaa.gov.

3012. Preventing False Alerts

False alerts, transmission of an alert signal by an activated COSPAS-SARSAT EPIRB in situations other than distress, can cause delays in the responses of rescue agencies and can potentially overwrite actual distress alerts in the satellite memory.

To prevent false alerts follow your manufacturer directions for mounting and testing the EPIRB.

If your EPIRB is accidentally activated turn it off and contact the U.S. Coast Guard to report the activation with your 15-digit UIN available.

Intentionally transmitting a false alert can result in fines and jail time.

3013. Disposing of EPIRBs

When disposing of an old or unneeded EPIRB precautions must be taken to prevent accidental transmission from the disposal site. Before disposal, consult with the EPIRB manufacturer's instructions for specific guidance on procedures and recommendations. Contacts for EPIRB manufacturers can be found at:

https://www.cospas-sarsat.int/en/contacts-pro/contacts-details-all.

At a minimum the EPIRB battery should be removed, the EPIRB should be clearly labeled as inactive, and the EPIRB registration should be updated to reflect disposal of the unit.

When possible the components of the old EPIRB and the EPIRB batteries should be recycled at an appropriate facility.

3014. Testing EPIRBs

EPIRB owners should periodically check for water tightness, battery expiration date, and signal presence. 406 MHz EPIRBs have a self-test function which should be used in accordance with manufacturers' instructions at least monthly.

3015. The Cospas-Sarsat System

COSPAS is a Russian acronym for “Space System for Search of Distressed Vessels”; SARSAT signifies “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 radiobeacons transmitting on the 406 MHz frequency. Since its inception in 1982, the COSPAS-SARSAT system (SARSAT satellite only) has contributed to saving over 39,000 lives.

The USCG receives data from Maritime Rescue Coordination Center (MRCC) stations and SAR Points of Contact (SPOC). See Table 3015.

Country	*Location*	*Designator*
Algeria	Algiers	ALMCC
Argentina	El Palomar	ARMCC
Australia	Canberra	AUMCC
Brazil	San Paulo	BBMCC
Canada	Trenton	CMCC
Chile	Santiago	CHMCC
China	Beijing	CNMCC
France	Toulouse	FMCC
Greece	Athens	GRMCC
Hong Kong	Hong Kong	HKMCC
India	Bangalore	INMCC
Italy	Bari	ITMCC
Indonesia	Jakarta	IONCC
ITDC	Taipei	TAMCC
Japan	Tokyo	JAMCC
Korea (Rep. of)	Incheon	KOMCC
New Zealand*	-	-
Nigeria	Abuja	NIMCC
Norway	Bodo	NMCC
Pakistan	Karachi	PAMCC
Peru	Calloa	PEMCC
Russian Federation	Moscow	CMC
Saudi Arabia	Jiddah	SAMCC
Singapore	Singapore	SIMCC
South Africa	Cape Town	ASMCC
Spain	Maspalomas	SPMCC
Thailand	Bangkok	THMCC
Turkey	Ankara	TRMCC
UAE	Abu Dhabi	UKMCC
United Kingdom	Kinloss	UKMCC
United States	Suitland	USMCC

* New Zealand's ground stations connect directly to Australia's AUMCC.

Table 3015. Participants in Cospas-Sarsat *system.*

3016. Operation of the Cospas-Sarsat System

When an EPIRB is activated, COSPAS/SARSAT picks up the signal, locates the source and passes the information to a land station. From there, the information is relayed to Rescue Coordination Centers, rescue vessels and nearby ships. This constitutes a one-way only communications system, from the EPIRB via the satellite to the rescuers. COSPAS/SARSAT instruments are carried by two satellite constellations which provide for global detection and location of emergency beacons. The Low Earth Orbit (LEO) constellation consists of low-altitude, near-polar orbiting satellites. These satellites exploit the Doppler principle to locate the 406 MHz EPIRB within approximately 5km.

As a LEO satellite approaches a transmitting EPIRB, the frequency of the signals it receives is higher than that being transmitted; when the satellite has passed the EPIRB, the received frequency is lower. This creates a notable Doppler shift. When the satellite approaches a ground station, known as a Local User Terminal (LUT), the LUT receives the recorded beacon frequency data from the satellite and then calculates the position of the EPIRB taking into account the Earth's rotation and other factors.

Because of the low orbit and small footprint of LEO satellites a satellite will pass overheard roughly every 45 minutes and delays are possible.

The Geo-stationary Earth Orbit (GEO) constellation consists of high-altitude satellites in orbits which keep them in a fixed location over the equator. The large footprint of GEO satellites complements the LEO constellation by providing for instantaneous detection of an active beacon anywhere in the world. However, as GEO satellites are stationary relative to the ground, they cannot independently locate a beacon.

Newer EPIRBs incorporate an additional GPS chip and use a protocol which encodes GPS coordinates into the beacon's digital transmission. The Geostationary segment of the SARSAT constellation retransmits the encoded message to ground stations, providing a near-instantaneous position which can minimize the delay in identifying the distress location.

Each 406 MHz EPIRB incorporates a unique identification code. Once the satellite receives the beacon's signals, the beacon's digital data is recovered from the signal, time-tagged, and transferred to the repeater downlink for real time transmission along with any Doppler frequency or position data to a LUT. The digital data coded into each 406 MHz EPIRBs memory indicates the identity of the vessel to SAR authorities. They can then refer to the EPIRB registration database for information about the type of vessel, survival gear carried aboard, whom to contact in an emergency, etc. The data includes a maritime identification digit (MID, a three digit number identifying the administrative country) and either a ship station identifier (SSI, a 6 digit number assigned to specific ships), a ship radio call sign or a serial number to identify the ship in distress.

See Figure 3016a for a graphical overview of the COSPAS-SARSAT system.

3017. Alarm, Warning, and Alerting Signals

For MF (i.e. 2182 kHz), the signal consists of either (1) a keyed emission modulated by a tone of 1280 Hz to 1320 Hz with alternating periods of emission and silence of 1 to 1.2 seconds each; or (2) the radiotelephone alarm signal followed by Morse code B (— • • •) and/or the call sign of the transmitting ship, sent by keying a carrier modulated by

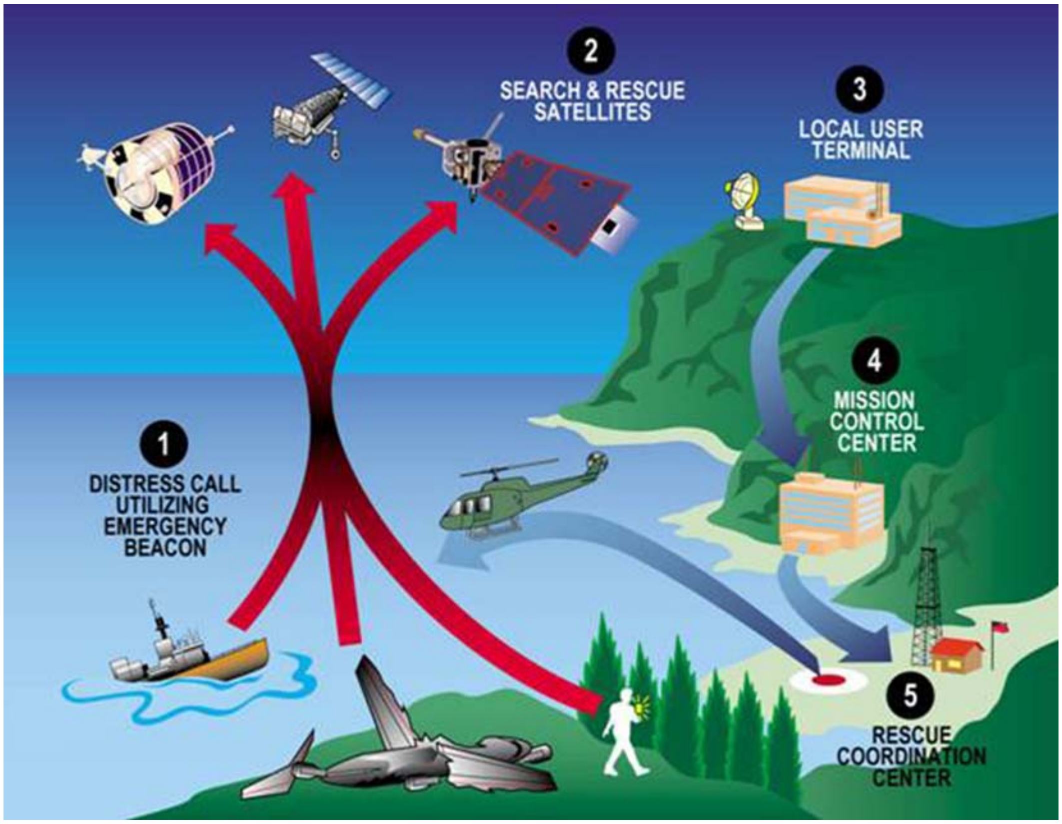

Figure 3016a. COSPAS-SARSAT System Overview. (1) Emergency locater transmitters (ELTs), EPIRBs, and personal locater beacons (PLBs) operate on the 406 MHz frequency. Each 406 MHz beacon transmits a unique digital code that identifies the type of beacon and that allows registration data to be associated with the beacon. The registration data provides information such as the beacon owner; the type of platform the beacon is associated with; emergency points of contact; and much more. (2) After the satellite receives a beacon signal, it relays the signal to ground stations referred to as local user terminals (LUTs). There are two types of LUTs: Low-Earth Orbiting LUTs (LEOLUTs) which receive and process alert data from the polar-orbiting satellites; and Geostationary LUTs (GEOLUTs) which receive and process alert data from geostationary satellites.(3) The LUT processes the data and transmits an alert message to its respective Mission Control Center (MCC) via a data communication network. (4) The MCC performs matching and merging of alert messages with other received messages, geographically sorts the data, and transmits a distress message to another MCC, an appropriate SAR authority such as a national Rescue Coordination Center (RCC) or a foreign SAR Point of Contact (SPOC). (5) The RCC investigates the beacon alert and launches assets to find the parties in distress when necessary.

a tone of 1300 Hz or 2200 Hz. For VHF (i.e. 121.5 MHz and 243 MHz), the signal characteristics are in accordance with the specifications of Appendix 37A of the ITU Radio Regulations. For 156.525 MHz and UHF (i.e. 406 MHz to 406.1 MHz and 1645.5 MHz to 1646.5 MHz), the signal characteristics are in accordance with CCIR recommendations.

The purpose of these signals is to help determine the position of survivors for SAR operations. They indicate that one or more persons are in distress, may no longer be aboard a ship or aircraft, and may not have a receiver available.

AUTOMATIC IDENTIFICATION SYSTEMS

3018. Development and Purpose

Automatic Identification System (AIS) is a navigation-communication protocol used in the maritime VHF-FM band, to autonomously exchanges real-time navigation information amongst other AIS users or stations. Given that AIS is digital protocol, it facilitates that its data can -but not currently required to-be used or portrayed on other systems, such as ECDIS, radar, VTS monitors, personal computers, shore-side web services, etc.

Upon proliferation of regional (and disparate) tracking systems in the early 1990 (i.e. Dover Straits, Panama Canal, Sweden, Prince William Sound, AK), various member entities exhorted IMO to consider the development of a universal tracking system, which in 1998 led to the IMO Marine Safety Committee to formally agree to and adopt Performance Standards for a Universal Shipborne Automatic Identification System (later to be solely known as AIS), which use was mandated in 2000 on all tankers, seagoing passenger and cargo ships (those over 300 GT), via an amendment to the Safety of Life at Sea Convention (SOLAS Regulation V/19.2.4). Since then, AIS carriage requirements have expanded domestically and on smaller vessels; particularly in the United States which requires AIS on all commercial self-propelled vessels of sixty-five feet or greater, most commercial towboats, and any vessel moving certain dangerous cargoes or flammable in bulk.

The IMO (Resolution MSC74(69)) defines the primary functions or purposes of AIS as:

1. in ship-to-ship mode, for collision avoidance;
2. in a ship-to-shore mode, as a tool for vessel traffic management, and,
3. a means to obtain specific data about ships, and their cargo, operating in coastal waters.

AIS devices are designed to operate autonomously, without user intervention or external infrastructure or signals, as transponder require; albeit they can be interrogated (polled) or tele-commanded to report faster or not all). AIS rely upon time-division multiple access (TDMA) procedures. The VHF data link (VDL) is divided into 2,500 equal slots of time per channel to reserve or schedule its transmissions, which it does randomly accessing a free slot, when available. What makes AIS unique to cellular telephones that use TDMA, is that certain AIS devices (i.e. Class A, Class B-SO) self-organize themselves on the VDL. So rather the 'dropping a call' as cell-phone users may experience when they go beyond a cell tower range or when the cell therein is beyond capacity, each AIS acts as its own cell tower and coordinates its reception so to favor AIS transmission that are closest to themselves, and which pose the greater collision risk.

The range of AIS-as with all VHF (line-of-sight) systems-is mostly affected by antenna height; however, since VHF-FM wavelengths are slightly longer than radars, AIS signals tend to cross land and other obstructions moderately well. At sea, an AIS on the water can usually be seen at 3-4 miles, from a lifeboat at 6-8 miles, from fishing boats and pleasure craft at 8-12 miles, and, from large or higher ships at 15-30 miles. Given that its transmissions are line of sight, AIS can also be received from far ashore (25-50 miles out) and from satellite (1,000 miles).

Each IMO required AIS device consists of a: VHF transmitter; three receivers, two dedicated to AIS transmission, and another backwards compatible to VHF DSC (Ch. 70); a VHF and GPS antenna; an internal GPS for timing and positioning; a built in integrity test (BIIT) processor; a minimal keyboard display (MKD); two input-output interfaces, and, at least one output interface.

3019. Classes and Reporting

There are two classes of shipborne AIS transceivers: Class A devices which meet all IMO standards and Class B devices which are intended for non-compulsory use. Each AIS transmission (message) denotes the time of transmission and its source ID; a unique 9-digit Maritime Mobile Station Identity (MMSI) number. In addition, Class A devices transmit the following data, autonomously and continuously every 2-10 seconds (dependent on speed and changing course) and every three minutes when at anchor or moored (if it navigation status has been updated to reflect so), at a power of 12.5 watts:

- Navigation status: underway, anchored, not under command, etc. (manually selected)
- Lat. and long. to 1/10,000 minute
- Course over ground
- Speed over ground Position accuracy; source, i.e. GPS, GLONAS, INS, manually entered, etc.; and, whether Receiver Autonomous Integrity Monitoring (RAIM) is used True heading, to 1/10 degree (via external gyro or transmitting heading device (THD), if connected)
- Rate of turn indication (if connected)

In addition, the Class A AIS will transmit, static and voyage related data, every six minutes:

- IMO number, a unique identifier related to ship's hull
- Radio call sign.
- Name of ship, up to 20 characters
- Type of ship, from predefined list of types
- Dimensions of ship, to nearest meter (derived from the positioning system antenna location)
- Source of positioning system, i.e. GPS, GLONAS, Integrated Navigation System (INS), manually inputted, etc.
- Static Draft, to 0.1 meter; air draft is not defined
- Destination, to 20 characters
- ETA: month, day, hour, and minute in UTC.

There are two variants of Class B AIS devices: Self-Organizing (same as Class A) or Carrier-Sense Mode (only transmit if they 'sense' a free slot is available) devices. Both are interoperable with other AIS devices, but, dissimilar to Class A devices in that they operate at a lower power (Class B-SO @ 5 Watts; Class B0-CS @ 2 Watts) and either every 5-15 seconds (Class B-SO) or at a 30 second fixed reporting rate; and, do not support external sensors (i.e. gyro, rate of turn indicator, etc.); or report their IMO number, destination, static draft, and navigational status; or have the facilities to transmit safety text messages.

Since the advent of the IMO AIS mandate, AIS technology has expanded to other devices such as:

- onboard Search and Rescue (SAR) aircraft;
- as shore stations that perform as a network base station;
- co-located on aids to navigation (Real AIS ATON);
- remotely used to transmit ATON information to coincide with an existing physical aid to navigation (Synthetic AIS ATON);
- or where an ATON is electronically charted but does not physically exist (Virtual AIS ATON);
- and, as AIS locating devices, such as AIS EPIRB, AIS Man-overboard devices, and AIS Search and Rescue Transmitter (AIS-SART).

Each unique type of AIS device can be identified by its MMSI format: 111YYYXXX for SAR aircraft AIS; 00YYYXXXX for AIS Base Stations; 99YYYXXXX for AIS ATON; 970YYXXXX for AIS-SART; 9702YXXXX for MOB-AIS; 974YYXXXX for EPIRB-AIS.

AIS locating devices operate differently than most other AIS devices, using 'burst behavior'. To facilitate their locating, these devices transmit a pre-formatted safety text message which states whether the locating device is 'ACTIVE' or under 'TEST'. If the former, they will also transmit 7 position reports per minute, increasing the likelihood that at least one is transmitted on the crest of swell or wave. The great benefit of AIS locating devices is the each transmission includes the device's location, the SAR response unit does not need to continuously hone in or tediously adjust direction finding antennas as is required to locate other beacons or radar transponders; the latter is discussed in the following section.

SEARCH AND RESCUE RADAR TRANSPONDERS/TRANSMITTERS

3020. Operational Characteristics

There are two variants of Search and Rescue Transmitters: one that operates on AIS channels (see Section 3023), and the other that operates as a radar transponder, hereinafter SART. Operating much like a RACON, the **Search and Rescue Radar Transponder (SART)** is a passive rescue device which, when it senses the pulse from a radar operating in the 9 gHz frequency band, emits a series of pulses in response, which alerts the radar operator that some sort of maritime distress is in progress. Further, the SART signal allows the radar operator to home in on the exact location of the SART. The SART can be activated manually, or will activate automatically when placed in water.

The SART signal appears on the radar screen as a series of 12 blips, each 0.64 nautical miles apart. As the vessel or aircraft operating the radar approaches the SART location, the blips change to concentric arcs, and within about a mile of the SART become concentric circles, centered on the SART.

Because the SART actively responds to radar pulses, it also informs its user, with an audible or visual signal, that it is being triggered. This alerts the user in distress that there is an operating radar in the vicinity, whereupon they may send up flares or initiate other actions to indicate their position.

Approved SARTs operate in standby mode for at least 96 hours and actively for at least 8 hours. Because the SART signal is stronger than any surrounding radar returns, it will be easily sensed by any nearby radar. But because it is much weaker than the radar, its own range is the limiting factor in detection.

3021. Factors Affecting SART Range

SART range is affected by three main factors. First, the type of radar and how it is operated is most important. Larger vessels with powerful, high-gain antennae, set higher above sea level, will trigger and detect the SART signal sooner than low-powered radars set closer to sea level. The radar should be set to a range of 12 or 6 miles for best indication of a SARTs signal, and should not have too narrow a receive bandwidth, which might reduce the strength of the received signal.

Second, weather is a factor in SART range. A flat calm might cause multipath propagation and distort the SARTs signal. Heavy seas may cause the SART signal to be received intermittently as the transponder falls into the troughs of the seas. Careful adjustment of the sea and rain clutter controls will maximize the SARTs received signal strength.

Third, the height of the SART will greatly affect the range, because the signal obeys the normal rules for radio waves in its spectrum and does not follow the curvature of the earth, except for a small amount of refraction. Tests indicate that a SART floating in the sea will have a range of about 2 nautical miles when triggered by a radar mounted 15 meters above sea level. At a height of 1 meter, range increases to about 5 miles. To an aircraft actively searching for a SART at an altitude of 3.000 feet, the range increases to about 40 miles.

3022. Operating the Radar for SART Detection

Only an X-band (3 cm) radar can trigger and sense a SART. An S-Band (10 cm) radar will neither trigger nor detect a SART. Normally, an X-band radar will sense a SART at about 8 nm. When triggered by an incoming radar signal, the SART will transmit a return signal across the entire 3 cm radar frequency band. The first signal is a rapid 0.4 microsecond sweep, followed by a 7.5 microsecond sweep, repeated 12 times. This will cause a series of 12 blips on the radar, spaced 0.64 nm apart. See Figure 3022a.

For best reception, the radar should be set to medium bandwidth and to the 12 or 6 mile range. Too narrow a bandwidth will cause the SART signal to be weakened, as

Figure 3022a. SART 12-dot blip code.

Figure 3022b. SART arcs.

the radar is not sensing the entire SART pulse. The radar operator's manual should be consulted for these settings. Less expensive radars may not be able to change settings.

As the range to the SART decreases to about 1 nm, the initial 0.4 microsecond sweeps may become visible as weaker and smaller dots on the radar screen. When first sensed, the first blip will appear about 0.6 miles beyond the actual location of the SART. As range decreases, the blips will become centered on the SART.

Figure 3022c. SART rings.

As the SART is approached more closely, the blips appearing on the radar become concentric arcs centered on the SART itself. The arcs are actually caused by the radar return of side lobes associated with the radar signal. While use of the sea return or clutter control may decrease or eliminate these arcs, it is often best to retain them, as they indicate the proximity of the SART. See Figure 3022b. Eventually the arcs become rings centered on the SART, as in Figure 3022c.

On some radars it may be possible to detune the radar signal in situations where heavy clutter or sea return obscures the SART signal. With the Automatic Frequency Control (AFC) on, the SART signal may become more visible, but the radar should be returned to normal operation as soon as possible. The gain control should usually be set to normal level for best detection, with the sea clutter control at its minimum and rain clutter control in normal position for the ambient conditions.

3023. Automatic Identification System - Search and Rescue Transmitter (AIS-SART)

January 1, 2010 the AIS-SART was added to GMDSS regulations as an alternative to the Radar SART. With the approval from IMO SOLAS Amendment in Resolution MSC 256(84) ship owners may choose either Radar SART or AIS SART to be carried on the vessel. AIS-SARTs have a built in GPS and transmit an alert message including the vessel ID and GPS position from the AIS tracking system. This information will appear on an AIS equipped vessel's chart plotter or ECDIS which differs from the traditional SART which displays on the Radar. The much lower operating frequency (160 MHz vs 9000MHz) from the AIS SART significantly increases the range of the signal and because VHF can propagate around land, the signal may be seen “around corners”. This is an improvement over Radar SART, particularly in areas of heavily incised coastlines and/or island archipelagos.

3024. Automatic Identification System (AIS) - Aids to Navigation (ATON)

AIS ATON stations broadcast their presence, identity (9-digit Marine Mobile Service Identity (MMSI) number), position, and status at least every three minutes or as needed. These broadcasts can originate from an AIS station located on an existing physical aid to navigation (Real AIS ATON) or from another location (i.e., AIS Base Station). An AIS Base Station signal broadcasted to coincide with an existing physical aid to navigation is known as a Synthetic AIS ATON. An electronically charted, but non-existent as a physical aid to navigation, is identified as a Virtual AIS ATON. The latter two can be used to depict an existing aid to navigation that is off station or not watching properly or to convey an aid to navigation that has yet to be charted. All three variants can be received by any existing AIS mobile device, but they would require an external system for their portrayal (i.e., AIS message 21 capable ECDIS, ECS, radar, PC). How they are portrayed currently varies by manufacturer, but the future intention is for the portrayal to be in accordance with forthcoming International Standards (i.e., IEC 62288 (Ed. 2), IHO S-4 (Ed. 4.4.0)).

Maritime authorities can quickly use Synthetic and Virtual AIS (SAIS/VAIS) ATON, sometime referred to as **eATON,** to temporarily reconstitute port ATON constellations in response to storm or hurricane damage. This grants recovery assets more time to address missing and/or off station aids.

SHIP TRACKING

3025. Long-Range Identification and Tracking (LRIT)

The Long-Range Identification and Tracking (LRIT) system, designated by the International Maritime Organization (IMO), provides for the global identification and tracking of ships. See Figure 3025 for more information.

The obligations of ships to transmit LRIT information and the rights and obligations of SOLAS Contracting Governments and of Search and rescue services to receive LRIT information are established in regulation V/19-1 of the 1974 SOLAS Convention.

The LRIT system consists of the shipborne LRIT information transmitting equipment, the Communication Service Provider(s), the Application Service Provider(s), the LRIT Data Center(s), including any related Vessel Monitoring System(s), the LRIT Data Distribution Plan and the International LRIT Data Exchange. Certain aspects of the performance of the LRIT system are reviewed or audited by the LRIT Coordinator acting on behalf of all SOLAS Contracting Governments.

LRIT information is provided to Contracting Governments to the 1974 SOLAS Convention and Search and rescue services entitled to receive the information, upon request, through a system of National, Regional and Cooperative LRIT Data Centers using the International LRIT Data Exchange.

Each Administration should provide to the LRIT Data Centre it has selected, a list of the ships entitled to fly its flag, which are required to transmit LRIT information, together with other salient details and should update, without undue delay, such lists as and when changes occur. Ships should only transmit the LRIT information to the LRIT Data Centre selected by their Administration.

Additional information concerning LRIT is available at the IMO website via the link in Figure 3025.

Figure 3025. Long-Range Identification and Tracking IMO website. http://www.imo.org/en/OurWork/Safety/Navigation/Pages/LRIT.aspx

The USCG maintains a National Data Center (NDC). The NDC monitors IMO member state ships that are 300 gross tons or greater on international voyages and either bound for a U.S.port or traveling within 1000 nm of the U.S. coast. LRIT complements existing classified and unclassified systems to improve Maritime Domain Awareness.

LRIT is a satellite-based, real-time reporting mechanism that allows unique visibility to position reports of vessels that would otherwise be invisible and potentially a threat to the United States.

The user interface for the US NDC is located at the Navigation Center (NAVCEN) in Alexandria, Virginia. NAVCEN operates the US LRIT interface called the Business Help Desk (BHD). BHD operators can perform a multitude of operations with a web-based user interface. Within this web-based application, the BHD watchstanders can view and request vessel status, see vessel information, request vessel positions, and increase and decrease vessel reporting rates.

The US NDC stores all of the positions from any LRIT ship, foreign or domestic, that enters our coastal water polygons. This information is available in real time to the BHD watchstander after performing a basic search for a vessel using the vessel name, IMO number, or MMSI (Maritime Mobile Service Identity) number. Per the LRIT international guidelines, the default ship reporting rate is every six hours. However, functionality is built in to allow end users to request a onetime poll that gives an on-demand current position. Watchstanders can also increase the reporting rate to every 3 hours, 1 hour, 30 minutes, or 15 minutes for a specified period of time.

3026. Commercial Ship Tracking

AIS data is viewable publicly, on the internet, without the need for an AIS receiver. Global AIS transceiver data collected from both satellite and internet-connected shore-based stations are aggregated and made available on the internet through a number of service providers. Data aggregated this way can be viewed on any internet-capable device to provide near global, real-time position data from anywhere in the world. Typical data includes vessel name, details, location, speed and heading on a map, is searchable, has potentially unlimited, global range and the history is archived. Most of this data is free of charge but satellite data and special services such as searching the archives are usually supplied at a cost. The data is a read-only view and the users will not be seen on the AIS network itself.

For an example of a commercial ship tracking website, providing AIS data on merchant vessels to the public, follow the link in Figure 3026a. Figure 3026b depicts a moment in time for ships transiting the Indian Ocean while transmitted AIS data.

Figure 3026a. http:// www.shipfinder.com

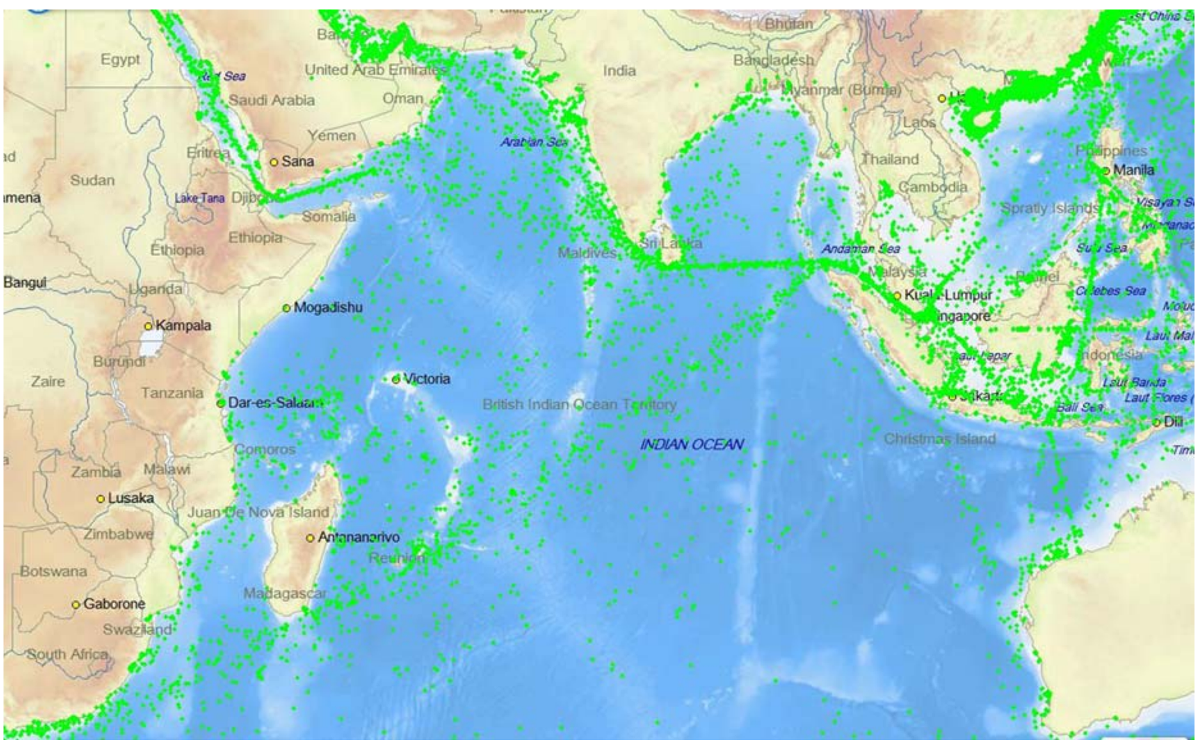

Figure 3026b. Typical AIS ship data for Indian Ocean.

U.S. MARITIME ADVISORY SYSTEM - GLOBAL

3027. Alerts and Advisories

In late 2016, MARAD launched the new U.S. Maritime Advisory System, which represents the most significant update since 1939 to the U.S. government process for issuing maritime security alerts and advisories. The new system establishes a single federal process to expeditiously provide maritime threat information to maritime industry stakeholders including vessels at sea. In response to valuable feedback from stakeholders, the **Maritime Advisory System** was developed to streamline, consolidate, and replace maritime threat information previously disseminated in three separate government agency instruments: Special Warnings, MARAD Advisories, and global maritime security related Marine Safety Information Bulletins.

The U.S. Maritime Advisory System includes two types of notifications: A **U.S. Maritime Alert** and a **U.S. Maritime Advisory**. Maritime Alerts quickly provide basic threat information to the maritime industry. When amplifying information is available, a more detailed U.S. Maritime Advisory may be issued on a threat and could include recommendations and identify available resources. U.S. Maritime Alerts and U.S. Maritime Advisories will be broadcast by the National Geospatial-Intelligence Agency, emailed to maritime industry stakeholders, and posted to the Maritime Security Communications with Industry (MSCI) web portal. A link to the web portal is provided in Figure 3027.

The U.S. Maritime Advisory System is a whole-of-government notification mechanism. The Departments of State, Defense, Justice, Transportation, and Homeland Security, and the intelligence community, supported the development of this new system in coordination with representatives from the U.S. maritime industry through the Alerts, Warnings and Notifications Working Group.

Questions regarding the U.S. Maritime Advisory System may be emailed to MARADSecurity@dot.gov. Additional contact information is available on the MSCI web portal.

MARAD
Maritime Administration

Figure 3027. MARAD's Maritime Security Communications with Industry website. http://www.marad.dot.gov/MSCI