

Lesson 8

SAR MISSION COMMUNICATIONS

Overview

Introduction

Without adequate and reliable communications, the system is less efficient, less effective, and ultimately less successful. People in distress have a variety of methods, ranging from sophisticated electronic devices, to waving a piece of cloth, for alerting the SAR System. Those methods can generally be classified as either electronic or visual/aural distress signals. This lesson will describe the various types of emergency communications used in the SAR system and explain the methods of communications employed to carry out a SAR mission.

Objectives

After completing this lesson, you should be able to:

- **DETERMINE** the radio transmission spoken emergency signals associated with: Distress, Urgency, and Safety.
 - **IDENTIFY** various types of visual, aural, and electronic emergency signals.
 - **STATE** the VHF-FM Digital Selective Calling (DSC) response policy for USCG surface resources.
 - **STATE** the lost communication procedures for USCG assets.
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References

The information in this lesson can be found in the following references:

1. IAMSAR Manual Vol. 2, Chapter 2
 2. National SAR Supplement, Chapter 3
 3. Coast Guard Addendum, Section 2.2.1.2(a), 2.2.2.3, 2.2.4, 2.2.6, 2.6.1, 2.6.1.1, 2.9, 3.4.4, 3.4.4.2, 3.4.4.2(a), Table 3-5 & Appendix C.2
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Emergency Signals

Spoken Emergency Signals

Distress, Urgency, and Safety signals:

Distress signal – MAYDAY is used to indicate that a craft is in distress and requires immediate assistance, and has priority over all other communications.

Urgency signal – PAN-PAN (pronounced PAHN-PAHN) is used when the safety of a craft is in jeopardy or an unsafe situation exists that may eventually involve a need of assistance, and has priority over all but distress traffic.

Safety signal – SECURITE (pronounced SECURITAY) is used for messages concerning safety of navigation or giving important meteorological warnings.

Any message beginning with one of these signals has precedence over routine messages. The signal is repeated three times at the beginning of the message. The hearer should listen, not transmit during these messages, and assist if possible.

Visual Distress Signals

Commonly used visual distress signals include flares, signal mirrors, dye markers, smoke, and flags. In addition to these signals, daylight visual signals may include fluorescent material and night devices may include strobes, incandescent or chemical lights, pyrotechnics or reflective materials. Some examples of visual distress signals include:

- a square flag having above or below it a ball or anything resembling a ball.
 - flames, (flames are very effective at night, and have been sighted as far away as 50 miles);
 - red flares, which have been sighted up to 35 miles at night, with an average of 10 miles at night, and about 1 to 2 miles during daylight;
 - orange smoke, effective up to 12 miles during the day if winds are less than 10 knots, with an average 8 mile range;
 - slowly and repeatedly raising and lowering arms outstretched to each side;
 - inverted flag;
 - flashes from a signal mirror, with an average detection range of five miles, but sometimes detectable up to 45 miles; and
 - dye-stained water, normally green or red, has been sighted up to ten miles away, with an average detect ability of three miles
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Emergency Signals

Sound Distress Signals

Sound signals of various sorts are used in underwater and surface search operations. Acoustic beacons (pingers) installed on some aircraft and self-contained pingers, actuated by immersion in salt water or by remote sound signals, can be detected by sonar at ranges of up to 3 miles, but have an average range of 1 mile. Surface sound devices include gunshots, whistle signals, sirens and the human voice. Gunshots are usually limited to a range of approximately 1-mile, while whistles are limited to about 1000 yards. Detecting sound on the earth's surface depends on the loudness of the device, the amount of moisture in the air and the direction and force of the surface wind.

Electronic Distress Signals

Radio Telephone Alarm Signal – A warbling two-tone signal alternating four times per second and continued for thirty seconds to one minute. It is transmitted on 2182 KHz or 156.8 MHz (VHF Channel 16) to attract attention.

All Ships Selective Call – Actuates the receiving selectors on all ships that are equipped with Digital Selective Calling (DSC) regardless of the code number.

Navigational Safety Broadcast – A one-tone signal transmitted by coast radio stations continuously for a period of fifteen seconds before navigational warnings are transmitted.

Emergency Position Indicating Radio Beacon (EPIRB), Emergency Locator Transmitter (ELT), and Personal Locator Beacon (PLB) are devices specifically designed to transmit emergency signals to alert the SAR system and that can be located by satellites and by direction finding (DF) equipment. Each device is battery operated and engineered for a particular environment. EPIRBs are maritime devices and as such are required to be waterproof, corrosion resistant and able to float upright on their own (for those designed to float). ELTs are built to survive the tremendous force of an aircraft crash. However, they are carried inside the aircraft and are usually less waterproof and non-floating. PLBs are designed to be manually activated and operate on land.

EPIRB

121.5 MHz

On November 3, 2000, the National Oceanic and Atmospheric Administration (NOAA) announced that satellite processing 121.5/243.0 MHz emergency beacons will be terminated on February 1, 2009. Class A and B EPIRBs must be phased out by that date. The U.S. Coast Guard no longer recommends these EPIRBs be purchased.

406 MHz

The 406 MHz EPIRB was designed to operate with satellites. The signal frequency (406 MHz) has been designated internationally for use only for distress. Its signal allows a satellite local user terminal to accurately locate the EPIRB (much more accurately -- 2 to 5 km vice 25 km -- 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 are detectable not only by COSPAS-SARSAT satellites which are polar orbiting, but also by geostationary GOES weather satellites. EPIRBs detected by the GEOSTAR system, consisting of GOES and other geostationary satellites, send rescue authorities an instant alert, but without location information unless the EPIRB is equipped with an integral GPS receiver. EPIRBs detected by COSPAS-SARSAT satellites provide rescue authorities location of distress, but location and sometimes alerting may be delayed as much as an hour or two.

Homing Signal

These EPIRBs 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.

EPIRB Testing

406 MHz EPIRBs can be tested through its self-test function, which is an integral part of the device. 406 MHz EPIRBs can also be tested inside a container designed to prevent its reception by the satellite. Testing a 406 MHz EPIRB by allowing it to radiate outside such a container is illegal.

SAR Communications

Procedural Words

AFFIRMATIVE – Means “yes”.

BREAK – Used to separate portions of a message or one message from another.

FIGURES – Spoken just before numbers are given in a message.

I SPELL – Used just before a phonetic spelling.

NEGATIVE – Mean “no”.

OUT – Indicates the end of a transmission when no reply is expected or required.

OVER – Indicates the end of a transmission when an immediate reply is expected.

ROGER – Means “I have received your transmission satisfactorily”.

SILENCE (pronounced SEE LONSS) – Said three times and mean cease all transmission immediately.

SILENCE FINI (pronounced SEE LONSS FEE NEE) – Silence is lifted, and is used to signify the end of the emergency and resumption of normal traffic.

THIS IS – Said before the station name or call sign, which immediately follows.

WAIT – Means “Stand by”.

Communicating with Various Craft

Aircraft:

Aircraft normally communicate on voice channels only and maintain a continuous listening guard on at least one emergency channel. They usually have the ability to communicate on:

- VHF Civil Aircraft (short range / line of sight)
- UHF Military Aircraft (short range / line of sight)
- HF Military and Civil Aircraft (long range)

Coast Guard fixed wing aircraft typically maintain a communications guard with an area communications facility while helicopters maintain a guard with the sector radio station. Other military aircraft usually maintain a communications guard with a parent activity radio station.

SAR Communications

All aircraft on instrument flight plans maintain a communications guard with an Air Traffic Control (ATC) facility and may be contacted through the nearest Air Route Traffic Control Center (ARTCC).

Civilian commercial aircraft on both long and short-range flights normally are required to file a flight plan and at a minimum maintain a flight following status with ATC or Center facility. Commercial aircraft on oceanic flights will maintain a communications guard with Aeronautical Radio Incorporated (ARINC).

Merchant Vessels:

Merchant vessels normally communicate on MF or HF frequencies. Attempts to contact a merchant vessel should be made on 2182 KHz voice or 156.8 MHz (VHF Channel 16) voice. When contact is made, shift the traffic to a working frequency.

Not all merchant ships keep a continuous guard on these frequencies. Transmission of an auto alarm signal is considered an actual distress in progress.

Small Craft:

Recreational vessels normally communicate on HF voice or VHF-FM voice. In addition, some still use Citizen's Band (CB).

SAR Mission Messages

These messages include Situation Reports (SITREPs), Search Action Plans (SAPs), SAR Operational messages, Rescue Action Plans, all ships broadcast, aircraft alerting messages, and miscellaneous SAR messages. They should normally be unclassified, written in plain language and require no key to decrypt.

DSC

Digital Selective Calling policy and procedures are described in section 2.2 of the CG Addendum.

Lost Communications

Lost communications with a Coast Guard asset are contained in section 2.9 of the CG Addendum.
