2013

Radio Operator Short Range

KILLALOE
NATIONAL WATER
ACTIVITY CENTRE

Handbook

Version 3.2

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Jan 2013

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National Water Activities Centre (NWAC)

The National Water Activity Centre (NWAC) of Scouting Ireland is situated 20 Km from Limerick City on the shores of Lough Derg which is just 3 Km from the village of Killaloe. The site is bounded on one side by an extensive forest with panoramic views of counties Clare and Tipperary. On the other side we have Lough Derg which is one of Ireland's most picturesque lakes leading up to the north to the villages of Mountshannon, Garrykennedy, Terryglass and Portumna.

The Centre is run by a trained group of volunteers and the training of staff is provided by the Irish Sailing Association (ISA).

The centre is the ideal location to explore water activities with your Section. The centre can provide canoeing, sailing, rafting and fun water based activities where your Section can explore the water with the comfort and security of trained staff. If you are experienced in water activities then the centre is an ideal base to explore the beauty of Lough Derg.

Killaloe is one of Ireland’s most attractive villages with many places of historical interest as well as excellent outdoor sporting facilities. Killaloe was also the home of Brian Boru, High King of Ireland in 1102, when it was the Capital of Ireland.

The centre is tasked with providing members of Scouting Ireland with access to Water Activities training. Training provided at the centre includes Sailing in small dinghy’s like the Topper Taz, Topaz and Laser Pico’s as well as sailing and rowing is small crewed Dutch Lelievlet vessels. The centre also has lake based canoe/kayak introduction training.

Marine Short Range Radio (VHF)

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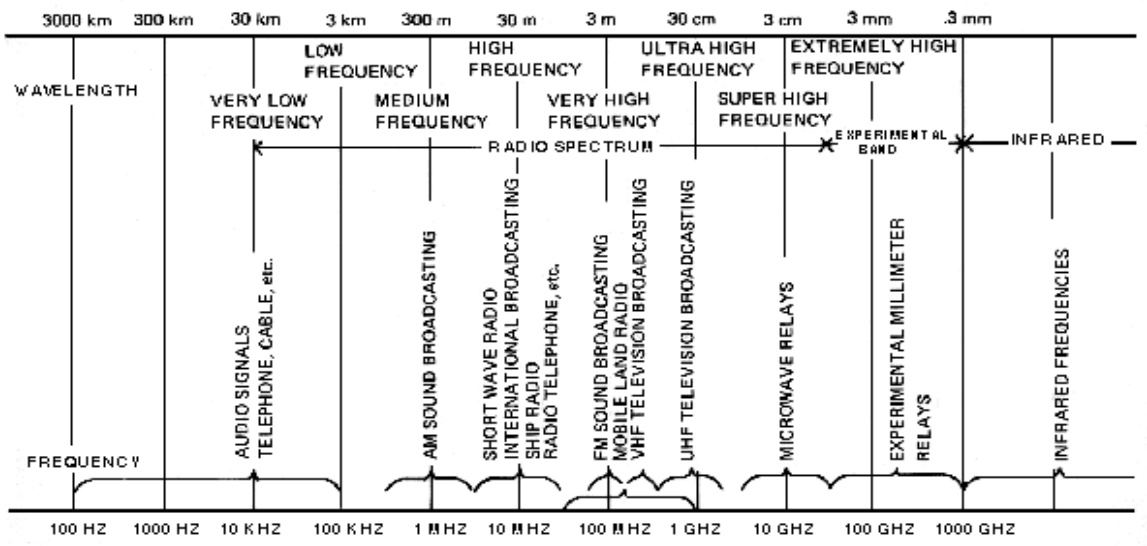
Radio Frequency Theory Introduction

10 kHz to 30 kHz	Very Low Frequency (VLF)
30 kHz to 300 kHz	Low Frequency (LF)
300 kHz to 3 MHz	Medium Frequency (MF)
3 MHz to 30 MHz	High Frequency (HF)
30 MHz to 328.6 MHz	Very High Frequency (VHF)
328.6 MHz to 2.9 GHz	Ultra High Frequency (UHF)
2.9 GHz to 30 GHz	Super High Frequency (SHF)
30 GHz and above	Extremely High Frequency (EHF)

The Radio Spectrum

The radio spectrum is broken into several bands as outline in the figure above. These bands are subdivided into certain allocated frequency ranges. These frequency ranges directly relate to specific solutions and technologies requiring an RF element as the physical layer.

Frequency Vs Wavelength



The frequency chosen for a specific solution or technology is usually allocated based on the characteristics of the frequency being used. Lower frequencies have a very long wavelength, whereas frequencies in the UHF (Ultra high frequencies) and SHF (Super High Frequencies) have very short wavelengths. Lower frequencies are affected more by atmospheric conditions and changes in the ionosphere then the previously mentioned higher frequencies. These frequencies also display the characteristics of using ground wave to communicate from one point to another. An example of low frequency communications would be Ham radios, which use characteristics in the ionosphere to bend or bounce a signal from one point on the earth to another. The higher frequencies tend to be more point to point or “line of sight”, examples of these types of frequencies would be microwave receiver/transmitters, satellite dishes or walkie-talkie devices.

It should be noted that most countries regulate the use of specific frequencies in each country. In order to use specific frequencies, typically an application to transmit on a given frequency needs to be requested from the communications regulator in the given country.

Wavelength, Frequency and Antenna Size

The length of a radio wave is inversely proportional to the frequency, the lower the frequency the longer the radio wave.

Wavelength (ƛ) = 300/Frequency (MHz).

Conversely, the higher the frequency the smaller the wave used. The length of the wave has a direct relationship to the size or length of the antenna so the higher the frequency the shorter the antenna.

ELF/VLF antenna on Submarines

Submarine ELF/VLF Buoyant wire antenna systems - Whilst submerged submarines use antenna systems connected to a buoy which can be reeled in or out allowing ELF/VLF communications via an extended and extremely long antenna. Because the frequency used is so low, (in some cases below the human voice range) the antenna can extend for Km.

Example of SHF antenna

Satellite communications employ such a high frequency, that the receiving end employs the distinctive satellite dish shape to "catch" the transmitted signal. The signal is so small that the dish "catches" the transmitted signal and focuses the waves on the LNB (Low Noise Block) at the centre of the dish. The waves are focused on the LNB because the antenna is so small; it is mounted in a housing which is referred to as the "*oven box*". The waves are so directional that strong winds on the dish can cause the angle to vary can lose the signal.

Marine VHF operates in the 156 - 162 MHz band so calculating the wavelength:

150 MHz – ƛ = 300/150 = 2m

While ƛ = 2m antennas are usually cut to ½ wavelength ($ƛ/_2$) = 1m is most usual. Small units can have even smaller antenna where electronics and the addition of coils electrically lengthen the antenna to match the frequency.

A property of radio waves at VHF frequencies is a tendency to travel in an almost straight line known as Line of Sight (LoS) between radios. These waves are referred to as “Space waves” and will not pass through objects such as hills or buildings. They can however be reflected by such structures. As such it is best to site the antenna at the highest point of the vessel in order to obtain the greatest communication range and on land on a tall structure such as a telecommunication tower or mast.

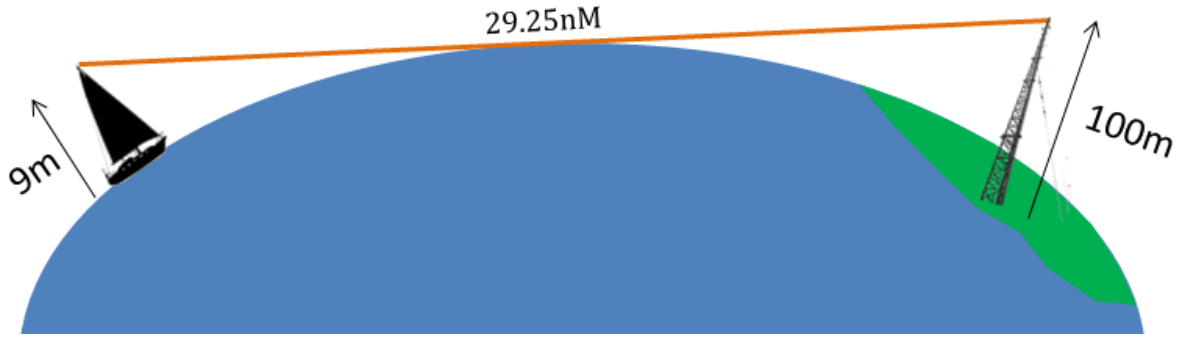
Calculating the range of a VHF signal at sea

The range of VHF communications at sea is determined by the distance to the visible horizon. This is calculated by the following formula:

$$Range\ [nM] = 2.25\ x\ \sqrt{Antenna\ height\ [m]}$$

When calculating the range between two antennas, the range of both need to be taken into consideration. The formula is following:

$$Range\ [nM] = 2.25\ x\ (\sqrt{Antenna\ height\ \#1\ [m]} + \sqrt{Antenna\ height\ \#2\ [m]})$$



Calculate the range between top of mast and the Coastal Radio Station (CRS)

$$Range\ [nM] = 2.25\ x\ (\sqrt{9} + \sqrt{100}\ )$$
$$Range\ [nM] = 2.25\ x\ (3 + 10\ )$$
$$Range\ [nM] = 2.25\ x\ 13 = 29.25$$
$$Range = 29.25nM$$

Marine VHF Radio

Licenses

All operators of Marine VHF radios must have a Short Range Certificate (SRC). A vessel with a Marine VHF fixed radio must have a Ships license containing the following information:

- Vessel name
- Owners name
- Owners address
- Call-Sign
- MMSI

If a vessel changes ownership then a updated ships license must

Message logging

It is required that a radio log book is maintained and while it is good practice that all messages are recorded it is only a legal requirement that distress messages sent or received are recorded. All radio checks/tests should be recorded in the log book also.

VHF Radio Technical introduction

Marine VHF radios mostly use SIMPLEX transmission, where communication can only take place in one direction at a time. A transmit button on the set or microphone determines whether it is operating as a transmitter or a receiver. The majority of channels, however, are set aside for DUPLEX transmission channels where communication can take place in both directions simultaneously. Each DUPLEX channel has two frequency assignments. This is mainly because, in the days before mobile phones and satellite communications became widespread, the DUPLEX channels could be used to place calls on the public telephone system for a fee via a marine operator.

The marine VHF frequency band from 156 MHz and 174 MHz has 57 VHF Channels (CH) numbered consecutively from VHF CH 1 - VHF CH 28 and from VHF CH 60 - VHF CH 88. The individual frequencies for each channel and whether they operate as either SIMPLEX or DUPLEX mode have been allocated by international agreement.

A DUPLEX channel is a pair of frequencies where the CRS Tx frequency is the Vessels Rx frequency and the Vessels Tx is the CRS Rx frequency. Therefore it is only possible to have communications between CRSs and vessels. Inter-vessel communications is not possible on DUPLEX channels. Therefore DUPLEX channels are referred to as Ship-to-Shore channels.

The most common channels in use are:

- Channels 01-05, 07, 23-28, 83-88 DUPLEX Correspondence channels:
    - Channel 04 is used by Galway Coast Guard.
    - Channel 28 is used by Shannon Coast Guard.
    - Channel 61 is used by Lough Derg Coast Guard.
    - Channel 62 is used by Lough Ree Coast Guard.
- Channels 06, 08, 72 and 77 Usable inter-ship channels.
- Channel 10 is used for oil pollution control.
- Channels 11, 12 & 14 are port channels for harbour operations.
- Channel 13 is a bridge to bridge for navigational purposes, large vessels are required to monitor.
- Channels 15 & 17 are low power channels restricted to 1 Watt.
- Channel 16 is a distress, safety and calling channel only.
- Channel 67 is used by Coast Guard for their own assets, keep off.
- Channel 70 is used for DSC and cannot be used for voice communication.
- Channel 80 is a marina channel i.e. Kilrush.
- Weather Forecasts at 0103, 0403, 0703, 1003, 1303, 1603, 1903 & 2203 on Coast Guard working channels.

A full table of these can be found in Appendix A.

Marine VHF radios can be fixed or portable. A fixed set generally has the advantages of a more reliable power source, higher transmit power, a larger and more effective aerial and a bigger display and buttons. A handheld VHF radio set can be carried to a lifeboat in an emergency, has its own power source and is more easily water-proofed.

Radios can be operated in voice only mode or with the use of Digital Selective Calling (DSC). DSC is part of the Global Maritime Distress Safety System (GMDSS) which bundles a number of advanced radio features to increase maritime safety.

Transmit Power

The maximum legal power that can be transmitted by a marine VHF radio is 25 watts (W) which is perfectly adequate for up to 10 nM. If communications is over a very short distance then it makes sense to reduce power to a lower setting, say 1 W which reduces demand on the power source and does not interfere with other transmissions in the same channel a few nM away. It also limits the effect of the “capture effect”. When VHF CH 15 or VHF CH 17 for on board communications only are selected then the power setting will automatically switch to low power.

Capture effect

When a radio is in receive mode it will lock on or capture the strongest signal it receives. It is defined as the complete suppression of the weaker signal at the receiver where the weaker signal is attenuated.

For example, 1 nM away two vessels which are transmitting on the same CH at the same time. One of them is transmitting on high power and another on low power. Only the signal from vessel that is transmitting on high power will be heard by our vessel.

For this reason you should first try to transmit on low power and only if you are unsuccessful you may try on high power.

Coastal Radio Station (CRS)

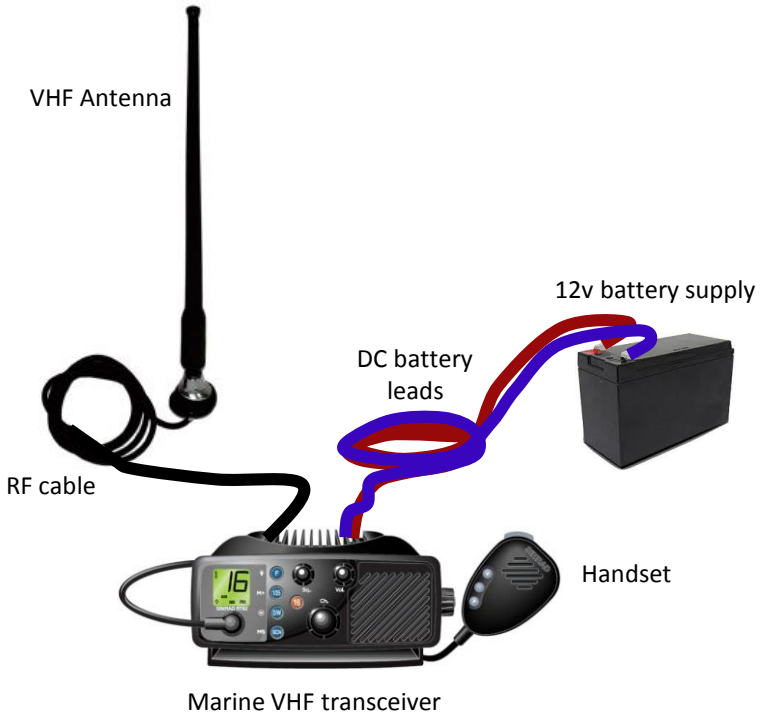
CRSs are maritime shore based radio stations which monitor radio distress frequencies, coordinate the radio traffic and relays ship-to-ship and ship-to-land communications. Most have remotely controlled sub-stations that increase the coastal waters area within VHF DSC coverage (Sea Area A1). In Ireland there are stations at Dublin, Malin Head, Co. Donegal and Valentia Island, Co. Kerry.

CRSs may have Direction Finding (DF) equipment to locate a ship or give the ship information on her actual position based on the received VHF radio signal.

Specialist CRSs can be categorised as Maritime Rescue and Coordination Centres (MRCC) or Maritime Rescue Sub Centres (MRSC) and co-ordinate Search and Rescue (SAR) activities. In Ireland there is a single MRCC in Dublin with two MRSC's in Malin Head and Valentia Island.

Some CRSs have NAVTEX and transmit Maritime Safety Information (MSI), navigational and meteorological warnings plus forecasts, urgent and distress priority messages. These are classified as NAVTEX CRSs.

Radio setup



The VHF radio consists of the following parts:

- Receiver (Rx) with an loudspeaker
- Transmitter (Tx) with a microphone
- An antenna enabling both SIMPLEX and DUPLEX operation
- Power supply (12v / 24v battery)

A VHF radio transmits and receives messages and the system is referred to as a Transceiver (TRANsmitter-ReCEIVER). It can be fixed or handheld.

Siting the VHF radio elements

For proper operation the radio must be situated clear of weather and direct sunlight and in such a position that background noise like that from the engine as well as being in a location that offers easy access for the operator. It should also be located away from compasses.

The VHF antenna should be fitted at the highest point of a vessel to get the greatest possible range. A good location is the top of the mast.

Linking to chart-plotter/Global Positioning System (GPS)

If possible the radio should be connected to a chart-plotter or GPS so the vessels location is being supplied to the radio. This is very helpful when sending distress messages as the radio will build the message automatically from this information.

Radio features

Squelch Control - Squelch excludes undesired lower-power input signals that may be present at or near the frequency of the desired signal. Squelch is a noise gate that only allows signals at a specified strength over a threshold to be played through the speaker. To cut out weaker signals, increase the squelch until the background interference noise disappears. To receive weaker signals, decrease the squelch.

Ch16 Override – This button is a quick method of setting the radio to channel 16.

Distress button – This button a Digital Selective Calling (DSC) will automatically change the set to channel 16 and send out a distress message.

Transmit Power – Low 1 Watt, High 25 Watts.

Dual watch – This enables monitoring of a channel plus channel 16. The operator is working on one channel but when a transmission is on channel 16 the radio will switch to that transmission.

Scanning – This feature enables monitoring of a multiple channels. The radio will stop at a channel when it detects a transmission. It is possible in this mode to miss a transmission.

Turn on the radio

- Turn on with volume switch about 1/3 of the range of the switch.
- Turn squelch until noise is being heard.
- Adjust volume until squelch sound is at the level you expect to hear voice.
- Turn squelch until noise is removed.

Global Maritime Distress Safety System (GMDSS)

The Global Maritime Distress Safety System (GMDSS) is an internationally agreed-upon set of safety procedures, types of equipment, and communication protocols used to increase safety and make it easier to rescue distressed ships, boats and aircraft as part of the Safety of Life at Sea (SOLAS) regulations.

GMDSS consists of several systems, some of which are new, but many of which have been in operation for many years. The system is intended to perform the following functions: alerting, search and rescue coordination, locating, maritime safety information broadcasts, general communications, and bridge-to-bridge communications. Specific radio carriage requirements depend upon the ship's area of operation, rather than its tonnage. The system also provides redundant means of distress alerting, and emergency sources of power.

Recreational vessels do not need to comply with GMDSS radio carriage requirements, but will increasingly use the Digital Selective Calling (DSC) VHF radios and offshore vessels may elect to equip themselves further. Vessels under 300 Gross Tonnage (GT) are not subject to GMDSS requirements and vessels from 300 to 500 GT have less restrictive carriage requirements than vessels 500 GT and over.

The minimum set of equipment are:

- Emergency Position-Indicating Radio Beacon (EPIRB)
- Handheld VHF radio

Emergency Position-Indicating Radio Beacon (EPIRB)

The 406 MHz EPIRB is an element of the GMDSS designed to operate with COPAS-SARSAT system. These automatic-activating EPIRBs, now required on ships, commercial fishing vessels, and all passenger ships, are designed to transmit to a rescue coordination centre a vessel identification and an accurate location of the vessel from anywhere in the world. The unit is set off by either the salinity of sea water or manually by depressing the button. There is a “float-free” variant with a hydrostatic release mechanism for life-rafts which are set off if the vessel is sinking. When the unit is immersed in 4m of seawater it breaks away from the boat and floats to the surface turning on the EPIRB.

The newest designs incorporate GPS receivers to transmit highly accurate positions of distress. They should be checked every month using the on unit TEST button which displays 5 solid flashes to indicate it is functional.

Each EPIRB is programmed with an Identity code by the distributor. This code includes the 3 digit country number and this country must keep a record of it in an EPIRB database. When an EPIRB is purchased it must be registered with this database. EPIRBs cannot be transferred from vessel to vessel.

The EPIRB consists of the following parts:

- Antenna
- Test switch
- Manual activation switch
- Sea Switch
- Strobe light
- LED / Buzzer
- Battery
- Lanyard
- Optional GPS

If an EPIRB is activated it transmits radio signals that are detected and processed by satellites. These satellites relay the message to a ground station where the EPIRBs identity number allows the land station to determine its position which is passed to the nearest MRCC. The MRCC coordinates a rescue and using the EPIRB ID it will firstly determine the country of origin, access the relevant database and identify the vessel.

COPAS-SARSAT

The COPAS-SARSAT is a satellite system comprising of 2 Russian COPAS and 2 SARSAT US/Canadian/French satellites that detect and locates emergency beacons activated by aircraft, ships and hikers in distress. The marine EPIRBs operate on 406 Mhz.

NAVTEX

Navtex is an international, automated system for instantly distributing maritime navigational warnings, weather forecasts and warnings, search and rescue notices and similar information to ships. A small, low-cost and self-contained "smart" printing radio receiver installed in the pilot house of a ship or boat checks each incoming message to see if it has been received during an earlier transmission, or if it is of a category of no interest to the ship's master. The frequency of transmission of these messages is 518 kHz in English, International NAVEX, while 490 kHz is use to broadcast in local language. 4209.5 kHz is allocated for tropical areas but is not in wide use.

Inmarsat

Satellite systems operated by the Inmarsat, under contract to the International Mobile Satellite Organization (IMSO), are also important elements of the GMDSS. Four types of Inmarsat ship earth station terminals are recognized by the GMDSS: the Inmarsat A, B, C and F77.

The Inmarsat C SafetyNET service is a satellite-based worldwide maritime safety information broadcast service of high seas weather warnings, navigational warnings, radio navigation warnings,

ice reports and warnings and other similar information not provided by NAVTEX. SafetyNET works similarly to NAVTEX in areas outside NAVTEX coverage.

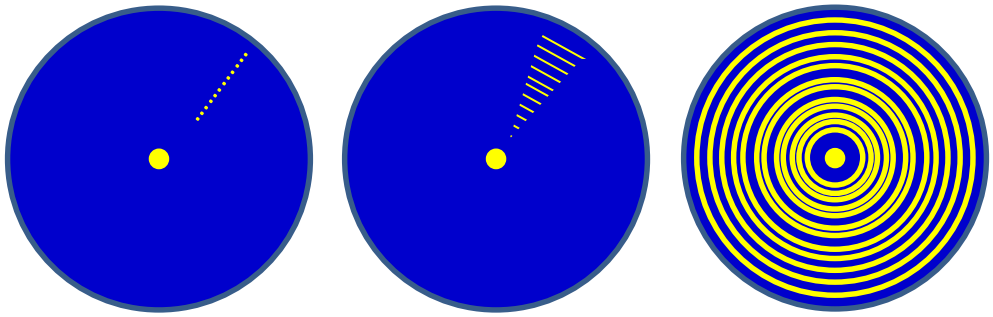
Long Range HF

GMDSS systems may include High Frequency (HF) radiotelephone and radio-telex (narrow-band direct printing) equipment, with calls initiated by digital selective calling (DSC). Worldwide broadcasts of maritime safety information are also made on HF narrow-band direct printing channels.

Search and Rescue Transponder (SART)

The GMDSS installation on ships include one or more Search and Rescue Transponder (SART) devices which are used to locate survival craft or distressed vessels by creating a series of 12 equally spaced dots/arcs/circles on a rescuing ship's 3cm X-band radar (9.2 - 9.5 GHz) display. The detection range between these devices and ships, dependent upon the height of the ship's radar mast and the height of the SART, is normally about 15 km.

Initially the SART will appear as 12 equally spaced dots but as the vessel or aircraft gets nearer to within 1 nM of the SART the dots start to change to arcs and when on top of the SART they turn to circles.



Digital Selective Calling (DSC)

Digital Selective Calling (DSC) was introduced on MF, HF and VHF maritime radios as part of the GMDSS system. DSC is primarily intended to initiate ship-to-ship, ship-to-shore and shore-to-ship radiotelephone and MF/HF radio-telex calls. DSC calls can also be made to individual stations, groups of stations, or "all stations" in one's reach. Each DSC-equipped ship, shore station and group is assigned a unique 9-digit Maritime Mobile Service Identity.

DSC distress alerts, which consist of a preformatted distress message, are used to initiate emergency communications with ships and rescue coordination centres. DSC was intended to eliminate the need for persons on a ship's bridge or on shore to continuously guard radio receivers on voice radio channels, including VHF channel 16 (156.8 MHz) and 2182 kHz now used for distress, safety and calling. A listening watch aboard GMDSS-equipped ships on 2182 kHz ended on February 1, 1999. In May 2002, International Maritime Organisation (IMO) decided to postpone cessation of a VHF listening watch aboard ships which ended on 1 February 2005.

IMO and International Telecommunication Union (ITU) both require that the DSC-equipped MF/HF and VHF radios be externally connected to a satellite navigation receiver. That connection will ensure accurate location information is sent to a rescue coordination centre if a distress alert is ever transmitted. The FCC requires that all new VHF and MF/HF maritime radiotelephones type accepted after June 1999 have at least a basic DSC capability.

Digital Selective Calling equipment, a part of GMDSS, provides all the functionality of voice-only equipment and, additionally, allows several other features:

- A transmitter can call a receiver automatically using Digital Selective Calling on Channel 70, using a telephone-type number known as a Maritime Mobile Service Identity (MMSI).
- A distress button, which automatically sends a digital distress signal identifying the calling vessel and the nature of the emergency.
- A connection to a GPS receiver allowing the digital distress message to contain the distressed vessel's position.

The MMSI is a nine digit number identifying a VHF set or group of sets. The three left hand digits of MMSI indicate the country called the Maritime identification digits (MID), in Ireland this is 250 so for all Irish vessels the 9 digit MMSI will start with 250.

SOLAS vessels must carry a VHF radio capable of transmitting DSC calls on CH 70. A VHF radio must be capable of maintaining a continuous watch on CH 70 automatically. A radio telephone log as a diary of radio calls must be maintained by the radio operator.

GMDSS Sea Areas

Sea Area A1

An area within the radiotelephone coverage of at least one VHF coast station in which continuous DSC (Ch.70/156.525 Mhz) alerting and radiotelephony services are available. Such an area could extend typically 40 km to 55 km from the Coast Station.

Sea Area A2

An area, excluding Sea Area A1, within the radiotelephone coverage of at least one MF coast station in which continuous DSC (2187.5 kHz) alerting and radiotelephony services are available. For planning purposes this area typically extends to up to 200 km offshore, but would exclude any A1 designated areas. In practice, satisfactory coverage may often be achieved out to around 750 km 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 lies between about latitude 76° NORTH and SOUTH, but excludes A1 and/or A2 designated areas.

Sea Area A4

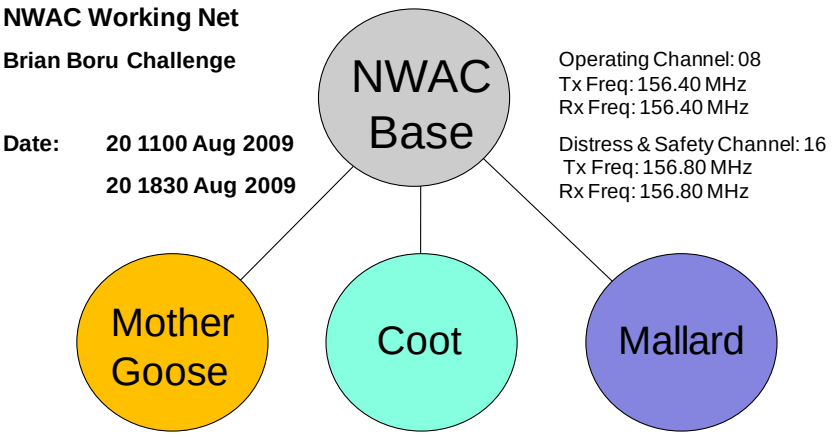
An area outside Sea Areas A1, A2 and A3 is called Sea Area A4. This is essentially the polar regions, north and south of about 76° of latitude, excluding any other areas.

Marine VHF Radio Operating Procedure

The accepted conventions for use of marine radio are collectively termed "proper operating procedure." These conventions include:

- Listening for 2 minutes before transmitting.
- Using Channel 16 only to establish communication (if necessary) and then switch to a different channel.
- Using a set of international "calling" procedures such as the "MAYDAY" distress call, the "PAN-PAN" urgency call and “SECURITÉ” navigational hazard call.
- Use prowords, phonetic alphabet and phonetic numbering to aid clarity.
- Hold the microphone or telephone mouthpiece directly in front of your mouth at a distance of no more than 30cm.
- Your speech will be more easily understood if you follow these rules (RSVP):
    - **Rhythm**. Keep a natural rhythm and divide your conversation or message into sensible phrases.
    - **Speed**. Slightly slower than normal conversation.
    - **Volume**. As for normal conversation. Shouting only causes distortion.
    - **Pitch**. Your voice should be pitched higher than usual but discomfort should be avoided.
- Monitor channel 16 at all times for other vessels in distress.

The Radio Net



Radio Net

The radio net is a group of radio stations working together for the purpose of communicating with each other.

Type of Stations

CONTROL STATION is responsible for Radio discipline and efficient clearance of traffic on the net. It normally associated with a centre or port. In the example above NWAC Base.

SUBSTATIONS Vessels and boats generally serve as substations on the net.

Call Signs

These are used to identify the stations and vessels on the net. This is in addition to the vessel name and is a unique alphanumeric identity that belongs to the vessel. In Ireland such call signs are issued by the Department of Transport and are prefixed with EI-EJ. CRSs also have their own call signs. For example the Marine Institute Research vessel "***Celtic Voyager***" has the call sign ***EIQN***.

EI*x*Y – Irish Naval Service IDs all end with a Y. *x* = A letter.

EI*xx* – Older call-sign series. *x* = Letter.

EI*yyyy* – Old call-sign series. *y* = Number.

EI*xxxy* – Current call-sign series. *x* = Letter, *y* = Number.

Maritime Mobile Service Identity (MMSI)

This is like a call sign that is used with Digital Selective Calling (DSC) to identify a vessel or coastal location. A Maritime Mobile Service Identity (MMSI) is a unique 9 digit number and acts as an address that is used to allow DSC calls. It acts as the identifier for the radio when DSC calls are transmitted. MMSI numbers are issued by the Department of Transport who maintain a database of issued numbers. The MMSI belongs to the vessel and should the radio move then the MMSI must be removed from it. CRSs have their own MMSI. As an example "***Celtic Voyager***" has the MMSI of ***250089000***.

The MMSI is programmed into the VHF DSC radio.

It is made up as follows:

CCCXXXXXXXXX where CCC is the country code called Maritime ID Digits (MID) and XXXXXX is the vessel unique identifier.

The MMSI number assigned to the vessel must be programmed by the VHF DSC radio supplier. In Ireland the country code is 250.

So for the Celtic Voyager MMSI: ***250089000***

250 = Country Code

089000 = Vessel ID

CRSs MMSI numbers are different and are made up as follows: 00CCCSSSS where CCC is the country code and SSSS is the Station number.

So for the Valentia Island MRSC - MMSI: ***002500200***

00 = Indicates a CRS

250 = Country Code

0200 = Station ID

Note: Malin Head - MRSC MMSI: ***002500100 and*** Dublin MRCC - MMSI: ***002500300***

Some companies with a fleet of vessels have Group MMSI. The format of such an MMSI is 0CCCFFFFF where CCC is the country ID, and FFFFF is the fleet ID. In such cases an individual vessel has two MMSI, a ships ID and a fleet ID.

Calling and Answering on a radio net

Parts of a Call:

CALL – TEXT – ENDING

Calling Transmission:

INITIAL CALL

<Call sign being called (repeat 3 times)> **THIS IS** < Call sign (repeat 3 times)>.

TEXT OF MESSAGE

The information to be passed.

ENDING

OVER	End of my transmission, a reply is expected.
OUT	End of my transmission, no reply is expected.

Answering Transmission:

ANSWERING CALL

<Call sign of answering station> **THIS IS** < Call sign >.

TEXT OF MESSAGE

The information to be passed or

RECEIVED	I have received you last transmission satisfactorily
WAIT XX MINUTES	Receiving station if busy may ask the sender to WAIT XX MINUTES. Note XX is replaced with up to 10 minutes.

ENDING

OVER, **OUT**.

Types of Initial Calls

Single Call A call form one station to another station.

"BASE", "BASE", "BASE" **THIS IS** "BRIAN CHARLES" **OVER**
"BRIAN CHARLES" **THIS IS "**BASE" send **OVER**
"BASE" **THIS IS** "BRIAN CHARLES" rescue boat required at kayak station **OVER**
"BRIAN CHARLES" **THIS IS "**BASE" **RECEIVED OUT**

Multiple Call A call to two or more stations.

"BRIAN CHARLES" **AND** "MOTHER GOOSE" **THIS IS** "BASE" MESSAGE **OVER**
"BASE" **THIS IS** "BRIAN CHARLES" send **OVER**
"BASE" **THIS IS** "MOTHER GOOSE" send **OVER**
"BRIAN CHARLES" **AND** "MOTHER GOOSE" **THIS IS** "BASE" return to base now **OVER**
"BASE" **THIS IS** "BRIAN CHARLES" **RECEIVED OUT**
"BASE" **THIS IS** "MOTHER GOOSE" **RECEIVED OUT**

All Station Call A call to all the stations on the net.

ALL STATIONS, ALL STATIONS, ALL STATIONS THIS IS "MOTHER GOOSE" **MESSAGE OVER**
"MOTHER GOOSE" **THIS IS** "BASE" send **OVER**
"MOTHER GOOSE" **THIS IS** "BRIAN CHARLES" **SEND OVER**
"MOTHER GOOSE" **THIS IS** "GENOA" send **OVER**
"MOTHER GOOSE" **THIS IS** "KAYAK STATION" send **OVER**
"MOTHER GOOSE" **THIS IS** "OARS STATION" send **OVER**
ALL STATIONS THIS IS "MOTHER GOOSE" returning to base with broken Laser Pico **OVER**
"MOTHER GOOSE" **THIS IS** "BASE" **RECEIVED OUT**
"MOTHER GOOSE" **THIS IS** "BRIAN CHARLES" **RECEIVED OUT**
"MOTHER GOOSE" **THIS IS** "GENOA" **RECEIVED OUT**
"MOTHER GOOSE" **THIS IS** "KAYAK STATION" **RECEIVED OUT**
"MOTHER GOOSE" **THIS IS** "OARS STATION" **RECEIVED OUT**

Prowords and their meaning

HULLO	Start of Call
THIS IS	Identity calling station.
SEND	Send your message, I am ready to receive.
OVER	I am finished my transmission and expect a reply.
OUT	I am finished my transmission but DO NOT expect a reply.
WAIT	I am bust and will get back to you in XX MINUTES.
MINUTES	Used with WAIT.
RECEIVED	Message received correctly.
ROGER	I received and acknowledge your message.
REQUEST RADIO CHECK	What is the strength and readability of my signal to you.
CORRECTION	What has been said is incorrect, the correct version is…….
WRONG	Reply to a repetition of a message that has an error.
STATION CALLING	Used when a called station is not sure who called it.
I SAY AGAIN	Used by sender when making repetitions for emphasis.
SAY AGAIN	Requested for repetition of all, or portion indicated, of a message.
ALL AFTER	Reference to a catch word or phase when requesting, or giving,
ALL BEFORE	Repetitions or corrections.
WORD BEFORE	Repetitions or corrections.
WORD AFTER	Repetitions or corrections.
FROM …. TO …..	Repetitions or corrections.
READ BACK	After OVER, repeat this message back to me exactly as received.

Phonetic Alphabet

Clear communications are critical when sending emergency VHF messages. To avoid any confusion, use the phonetic alphabet to spell out important information, such as your vessel name and the number and names of your crew. Here is the standard International phonetic alphabet.

Phonetic Alphabet:

A	**Alfa**	**(**Al**fah)**	N	**November**	**(No**vem**ber)**
B	**Bravo**	**(**Brah**voh)**	O	**Oscar**	**(Osscah)**
C	**Charlie**	**(**Char**lee)**	P	**Papa**	**(Pah**pah**)**
D	**Delta**	**(**Dell**ta)**	Q	**Quebec**	**(Keh**beck**)**
E	**Echo**	**(**Eck**oh)**	R	**Romeo**	**(**Row**meoh)**
F	**Foxtrot**	**(**Fok**strot)**	S	**Sierra**	**(See**air**rah)**
G	**Golf**	**(Golf)**	T	**Tango**	**(**Tang**go)**
H	**Hotel**	**(Hoh**tell**)**	U	**Uniform**	**(**You**neeform)**
I	**India**	**(In**dee**ah)**	V	**Victor**	**(**Vik**tah)**
J	**Juliett**	**(**Jew**leeett)**	W	**Whiskey**	**(**Wiss**key)**
K	**Kilo**	**(**Key**loh)**	X	**X-Ray**	**(**Ecks-ray**)**
L	**Lima**	**(**Lee**mah)**	Y	**Yankee (**	Yang**key)**
M	**Mike**		Z	**Zulu**	**(**Zoo**loo)**

There are two figures systems. The Federal Aviation Administration (FAA) and North Atlantic Treaty Organisation *(NATO) figures are pronounced as follows:*

0	Zero	
1	Wun	**(with emphasis on 'N')**
2	Too	**(with sharp 'T' and long 'OO')**
3	Thuh-ree	**(with short 'U' slight rolling 'R' and long 'E')**
4	Fo-wer	**(with long 'O' as in FOE)**
5	Fi-yiv	**(emphasizing the consonants, with ling 'I' for first syllable (as in PIE) and short for the second (as in GIVE))**
6	Six	**(with emphasis on 'X')**
7	Se-ven	**(with two distinct syllable s, the 'EN' as in HEN)**
8	Ate	**(with ling 'A')**
9	Niner	**(with long 'I' (as in PIE) and emphasizing each 'N')**

Corrections and Repetitions

Corrections during transmission

If the sender wishes to correct a word or phrase that has just been spoken, the pro-word **CORRECTION** is used followed by last correct word or phrase before the mistake, and then the corrected version.

"Base" **THIS IS** "GENOA" returning to base with broken Laser Pico **CORRECTION** Topaz **OVER**

Correction after the message has been sent

If a station realises that a mistake has been made in a message already sent, all the addresses are called, make a clear reference to the message followed by the pro-word WRONG and then the correction is made. The following pro-words may be used to the section of a message to be corrected.

SAY AGAIN, ALL AFTER, ALL BEFORE, WORD BEFORE, WORD AFTER, FROM…. TO……, REPEAT BACK

These pro-words are qualified by a correct word or phrase, which will help identify the part of the message being corrected.

Repetitions requested by transmitting station

If a station sends a message and wants to ensure it was received correctly it can request it is repeated back, e.g.

"BASE", "BASE", "BASE" **THIS IS** "GENOA" message **OVER**

"GENOA" **THIS IS** "BASE" send **OVER**

"BASE" **THIS IS** "GENOA" returning to base with broken Pico **REPEAT BACK OVER**

"GENOA" **THIS IS** "BASE" **I REPEAT BACK** returning to base without broken Pico **OVER**

"BASE" **THIS IS** "GENOA" **WRONG** returning to base with broken Pico **REPEAT BACK OVER**

"GENOA" **THIS IS** "BASE" **I REPEAT BACK** returning to base with broken Pico **OVER**

"BASE" **THIS IS** "GENOA" **ROGER OUT**

Repetitions requested by receiving station

If a station fails to receive all or part of a message, the pro-word **SAY AGAIN** is used to ask for a repetition. If it is used on its own the entire transmission is repeated.

If only part of the message is missed, the pro-word SAY AGAIN may be followed by a qualifying word or phrase, e.g.

"GENOA", "GENOA", "GENOA" **THIS IS** "MOTHER GOOSE" message **OVER**

"MOTHER GOOSE" **THIS IS** "GENOA" send **OVER**

"GENOA" **THIS IS** "MOTHER GOOSE" returning to base with broken Laser Pico **OVER**

"MOTHER GOOSE" **THIS IS** "GENOA" **SAY AGAIN** boat type **OVER**

"GENOA" **THIS IS** "MOTHER GOOSE" **I SAY AGAIN** Laser Pico **OVER**

"MOTHER GOOSE" **THIS IS** "GENOA" **RECEIVED OUT**

Or by identifying the part of the message using,

ALL AFTER, ALL BEFORE, WORD BEFORE, WORD AFTER, FROM…. TO……

"GENOA" **THIS IS** "MOTHER GOOSE" returning to base with broken Laser Pico **OVER**

"MOTHER GOOSE" **THIS IS** "GENOA" **SAY AGAIN ALL AFTER** base **OVER**

"GENOA" **THIS IS** "MOTHER GOOSE" **I SAY AGAIN** with broken Laser Pico **OVER**

"MOTHER GOOSE" **THIS IS** "GENOA" **RECEIVED OUT**

Radio check

A radio check allows the operator of a radio to confirm it is operational. A signal of full strength and with full readability is known as a "5 by 5" signal. "2 by 5" is weak but very clear signal. The first number is the strength of the signal while the second number measures the clarity of the signal.

1. Bad (Unreadable)
2. Poor (Readable now and then)
3. Fair (Readable with great difficulty)
4. Good (Readable with minor difficulty)
5. Excellent (Perfectly readable)

"BASE" "BASE" "BASE" **THIS IS** "BRIAN CHARLES" **REQUEST RADIO CHECK OVER**

"BRIAN CHARLES" loud and clear **OVER** ***- or -*** "BRIAN CHARLES" 5 by 5 **OVER**

"BASE" loud and clear **OUT** ***- or -*** "BASE" 5 by 5 **OUT**

The radio check cannot be on Channel 16 so if you are calling on channel 16 change to another channel to do the radio check.

"BASE" "BASE" "BASE" **THIS IS** "BRIAN CHARLES" **REQUEST RADIO CHECK OVER**

"BRIAN CHARLES" THIS IS "BASE" go to channel 7 1 I say again 7 1 **OVER**

"BASE" THIS IS "BRIAN CHARLES" 7 1 **OVER**

"BASE" 5 by 5 **OUT**

(Both switch to channel 71 and ….)

"BASE" "BASE" "BASE" **THIS IS** "BRIAN CHARLES" **REQUEST RADIO CHECK OVER**

"BRIAN CHARLES" 5 by 5 **OVER**

"BASE" 5 by 5 **OUT**

Track/Trip Report (TR)

It is encouraged that vessels provide CRSs with details of a voyage as they leave. TRs are useful in the event of a Search and Rescue (SAR) operation being required as it can help to determine the vessel's last known position. When the vessel arrives at the destination it should report the arrival to the CRS to allow the CRS close the TR. In the report the following should be included:

- From
- To
- Estimated Time of Arrival (ETA)
- Number of Persons on Board (POB)

"Coast Guard" "Coast Guard" "Coast Guard" **THIS IS** "COOT" **CALL-SIGN** EIUP **TR OVER**
"COOT" **THIS IS** "Coast Guard" **SEND OVER**

"Coast Guard" **THIS IS** "COOT" **CALL-SIGN** EIUP
DEPARTING NWAC BOUND FOR DROMINEER, 5 POB **OVER**

"COOT" **THIS IS** "Coast Guard" **ACKNOWLEDGED OUT**

After arriving at Domineer Coot should inform Base they have arrived.

"Coast Guard" "Coast Guard" "Coast Guard" **THIS IS** "COOT" **CALL-SIGN** EIUP **TR OVER**
"COOT" **THIS IS** "Coast Guard" **SEND OVER**

"Coast Guard" **THIS IS** "COOT" **CALL-SIGN** EIUP
ARRIVED SAFELY AT DROMINEER, 5 POB **OVER**

"COOT" **THIS IS** "Coast Guard" **ACKNOWLEDGED OUT**

Distress Calls

MAYDAY is a request for immediate assistance in an imminent life-threatening situation. If you hear a Mayday call, listen—do not transmit. Determine if you are in a position to assist. If not, maintain radio silence and monitor the call.

PAN-PAN announces an emergency when a boat and/or people are in jeopardy but not in imminent danger. As with a Mayday call, listen to the pan-pan call, determine if you are in a position to assist, and keep radio silence if you are not.

SÉCURITÉ (see-cure-i-tay) is the signal that navigation information or weather warnings will be broadcast.

Sending a DSC Distress call

(1) Move the Distress cover to the right

(2) Press the Distress button

(3) Use the menu keys to build the Distress message

Location

Time

Distress type

(4) Press the Distress button to send the message

On radios receiving the distress the radio will beep and OK and STOP options are given. The OK clears the screen and ceases the beep while STOP will cease the beep but leave the detail of the distress on the screen. If OK was selected then the operator will need to use the **DSC >> Log** to find the distress detail. Only a CRS can acknowledge the DSC distress. If the distress contains a reason for the distress like MOB it is termed a "***Designated Distress***".

DSC Urgent, Safety and Routine messages

To send an Urgent, Safety and Routine messages use the **DSC >> Call >> Type** option. Use the **DSC >> Call >> Dir** option to select the station to be transmitted to. Use the **DSC >> Call >> Chan** to select the channel the reply is expected on i.e. Channel 8.

Sending a Routine message

Send a Routine message to Coot's radio (MMSI) requesting a voice call on channel 77.

DSC >> CALL >> TYPE = Routine

DSC >> CALL >> DIR = Coot

DSC >> CALL >> CHAN = 77

DSC >> CALL >> SEND

Acknowledging a Routine message

Coot acknowledges by selected **ACK**, now the radio changes to the channel 77 as this is the channel that was selected in the DSC Routing message. Both parties can now have a voice call on channel 77 without having to do an initial voice call on channel 16.

Making a Mayday Call

To make a Mayday call

1. Send DSC Alert.
2. Send distress call on VHF CH16 and/or MF 2182 kHz.
3. Activate EPIRB Beacon.

Ensure the set is switched on and open the cover on the RED distress button, press the button and hold for over 5 seconds. Now set the channel switch to channel 16 and follow the instructions below. Remain calm, and speak clearly.

MAYDAY, MAYDAY, MAYDAY,THIS IS _____ [vessel name 3 times]
MAYDAY _____ [followed by vessel name and Call sign if you have one]
OUR POSITION IS _____ [Buoy no. or GPS]
NATURE OF DISTRESS IS _____ [Describe what happened]
AID REQUIRED _____ [Describe the assistance you require]
THERE ARE _____ [number] **PEOPLE ON BOARD**
THEY ARE [OK / INJURED / OVERBOARD]
OVER

Example:

MAYDAY, MAYDAY, MAYDAY, THIS IS "Coot", "Coot", "Coot"
MAYDAY "Coot" **CALL-SIGN** EI1435
OUR POSITION IS Lushing rocks 52° (degrees) 53" (decimal) 46' (minutes) North 8° 25" 16' West
NATURE OF DISTRESS IS boat has taken on water and is in danger of capsizing
AID REQUIRED I require immediate assistance
THERE ARE 4 **PEOPLE ON BOARD**.
THEY ARE OK
OVER

Release the Press to Talk (PTT) switch and listen for a reply and repeat every 60 seconds until you get an answer.

NOTE: It is a serious offence to make a false MAYDAY call. Should you accidently trip the DSC Distress button then transmit the following on channel 16.

ALL STATIONS, **ALL STATIONS**, **ALL STATIONS**, THIS IS "BRIAN CHARLES" **Call Sign** EIBN
POSITION rocks 52° 53" 46' North 8° 25" 16' West
Cancel my distress alert of 25 AUG 2009 at 17:20
THIS IS "BRIAN CHARLES" **Call Sign** EIBN
OUT

Acknowledging Mayday

Vessels that receive the Mayday can acknowledge to the sender.

MAYDAY

"Coot" **"**Coot" **"**Coot" **CALL-SIGN** EI1435 **THIS IS** "Grebe" "Grebe" "Grebe" **CALL-SIGN** EI6443

RECEIVED MAYDAY
OUT

Mayday Relay

If the CRS does not respond "Grebe" can assume that "Coot" is out of range of the CRS and assuming "Grebe" is nearer the CRS it can relay the Mayday.

MAYDAY RELAY MAYDAY RELAY MAYDAY RELAY

THIS IS "Grebe" "Grebe" "Grebe" **CALL-SIGN** EI6443

MAYDAY "Coot"

AT 0830 UTC received distress call including leading **MAYDAY** from **"**Coot" **CALL-SIGN** EI1435

POSITION IS Lushing rocks 52° (degrees) 53" (decimal) 46' (minutes) North 8° 25" 16' West
NATURE OF DISTRESS IS boat has taken on water and is in danger of capsizing
AID REQUIRED requires immediate assistance
THERE ARE 4 **PEOPLE ON BOARD**.
THEY ARE OK
OVER

Radio silence during a Mayday Call

Imposing Radio silence

Radio silence may be imposed on a channel while a distress situation is being handled using the proword **SEELONCE** from the word *Silence*.

MAYDAY
ALL STATIONS, ALL STATIONS, ALL STATIONS
THIS IS _____ [vessel or station name 3 times]
MAYDAY Coot
SEELONCE MAYDAY [prowords reserved for station controlling distress traffic ONLY]
TIME _____ [other stations close to distress may use **SEELONCE DISTRESS**]
OUT

Example:

MAYDAY
ALL STATIONS, ALL STATIONS, ALL STATIONS
THIS IS "Coast Guard" "Coast Guard" "Coast Guard"
MAYDAY "Coot"
SEELONCE MAYDAY
TIME 17:30
OUT

Relaxing radio silence for urgent traffic

Radio silence can be relaxed by distress controlling station for vessels or stations wishing to pass urgent messages on channel 16 using the proword **PRUDONCE** from the word prudence.

MAYDAY
ALL STATIONS, ALL STATIONS, ALL STATIONS
THIS IS "Coast Guard" "Coast Guard" "Coast Guard"
MAYDAY "Coot"
PRUDONCE, PRUDONCE
TIME 17:30
OUT

Lifting radio silence for urgent traffic

Radio silence is eventually lifted on channel 16 when the situation is under control using the proword **SEELONCE FEENEE,** Feenee is from the French word *fini*.

MAYDAY

ALL STATIONS, ALL STATIONS, ALL STATIONS

THIS IS "Coast Guard" "Coast Guard" "Coast Guard"

MAYDAY "Coot"

SEELONCE FEENEE

TIME 17:30

OUT

Making a Pan-Pan Call

Pan-Pan calls indicate an emergency situation that for the moment at least does not pose a threat to life or the vessel. Examples of Pan-Pan scenarios are fouled propeller, engine failure or out of fuel, small fire on board - now extinguished, unsure of position and man-overboard recovery. Pan-Pan can also be used to request medical technical advice over the radio, in this case the CRS will transfer you to a DUPLEX channel and connect the radio connection (i.e. Lough Derg – Channel 61) to a telephone connection to Cork University Hospital where medical advice can be given to the vessel.

To make a Pan-Pan call

1. Send emergency call on VHF CH16 and/or MF 2182 kHz.

Ensure the channel switch is set to channel 16 and follow the instructions below. Remain calm, and speak clearly.

PAN-PAN, PAN-PAN, PAN-PAN

_____ [Called name 3 times] **THIS IS** _____ [vessel name 3 times]

PAN-PAN

OUR POSITION IS _____ [Buoy no. or GPS]
NATURE OF DISTRESS IS _____ [Describe what happened]
OVER

PAN-PAN, PAN-PAN, PAN-PAN

"Coast Guard" "Coast Guard" "Coast Guard"

THIS IS "Mallard" "Mallard" "Mallard"

PAN-PAN

OUR POSITION IS Lushing rocks 52° (degrees) 53" (decimal) 46' (minutes) North 8° 25" 16' West
NATURE OF DISTRESS IS boat has taken on water and we are pumping out excess water
OVER

Release the PTT switch and listen for a reply.

Making a Sécurité Call

Sécurité calls indicate that what follows is important safety information. This is normally broadcast on Channel 16 on VHF or 2182 kHz on MF. Such a call is a defence against getting run down during fog.

To make a Sécurité call

1. Send safety information call on VHF CH16 and/or MF 2182 kHz.

Ensure the channel switch is set to channel 16 and follow the instructions below. Remain calm, and speak clearly.

SÉCURITÉ, SÉCURITÉ, SÉCURITÉ THIS IS _____ [vessel or station name 3 times]
SÉCURITÉ
OUR POSITION IS _____ [Buoy no. or GPS]
_____ [Describe what happened]

[Repeat after 30 seconds]
OUT

SÉCURITÉ, SÉCURITÉ, SÉCURITÉ THIS IS "Mallard" "Mallard" "Mallard"
SÉCURITÉ
OUR POSITION IS Crow Island 52° 52" 37' North 8° 25" 25' West
visibility is very poor due to heavy fog. Interested vessels contact channel 72

…… 30 sec pause ……

SÉCURITÉ, SÉCURITÉ, SÉCURITÉ THIS IS "Mallard" "Mallard" "Mallard"
SÉCURITÉ
OUR POSITION IS Crow Island 52° 52" 37' North 8° 25" 25' West
visibility is very poor due to heavy fog. Interested vessels contact channel 72
OUT

Release the PTT switch and change to working channel (72 in this example).

Appendix A – Marine VHF Channel Information

VHF Channel		Transmit	Receive	Use
0		156.000	156.000	
	60	156.025	160.625	
1		156.050	160.650	DUPLEX Correspondence channel
	61	156.075	160.675	DUPLEX Correspondence channel (Lough Derg)
2		156.100	160.700	DUPLEX Correspondence channel
	62	156.125	160.725	DUPLEX Correspondence channel (Lough Ree)
3		156.150	160.750	DUPLEX Correspondence channel
	63	156.175	160.775	
4		156.200	160.800	DUPLEX Correspondence channel (Galway)
	64	156.225	160.825	
5		156.250	160.850	DUPLEX Correspondence channel
	65	156.275	160.875	
6		156.300	160.300	Ship to ship working channel (Primary)
	66	156.325	160.925	
7		156.350	160.950	DUPLEX Correspondence channel
	67	156.375	156.375	Irish Coast Guard -own operations
8		156.400	156.400	Ship to ship working channel (Primary)
	68	156.425	156.425	Harbour operations
9		156.450	156.450	Ship to ship working channel (Secondary)
	69	156.475	156.475	
10		156.500	156.500	Oil polution control
	70	156.525	156.525	Digital Selective Calling
11		156.550	156.550	Harbour operations
	71	156.575	156.575	Harbour operations
12		156.600	156.600	Harbour operations
	72	156.625	156.625	Ship to ship working channel (Primary)
13		156.650	156.650	Bridge to bridge
	73	156.675	156.675	Ship to ship working channel (Secondary)
14		156.700	156.700	Harbour operations
	74	156.725	156.725	
15		156.750	156.750	Low power (1W) channel for on ship communications
	75	156.775	156.775	
16		156.800	156.800	Calling and Distress channel
	76	156.825	156.825	
17		156.850	156.850	Low power (1W) channel for on ship communications
	77	156.875	156.875	Ship to ship working channel (Primary)
18		156.900	161.500	
	78	156.925	161.525	
19		156.950	161.550	
	79	156.975	161.575	
20		157.000	161.600	
	80	157.025	161.625	
21		157.050	161.650	
	81	157.075	161.675	
22		157.100	161.700	
	82	157.125	161.725	
23		157.150	161.750	DUPLEX Correspondence channel
	83	157.175	161.775	DUPLEX Correspondence channel
24		157.200	161.800	DUPLEX Correspondence channel
	84	157.225	161.825	DUPLEX Correspondence channel
25		157.250	161.850	DUPLEX Correspondence channel
	85	157.275	161.875	DUPLEX Correspondence channel
26		157.300	161.900	DUPLEX Correspondence channel
	86	157.325	161.925	DUPLEX Correspondence channel
27		157.350	161.950	DUPLEX Correspondence channel
	87	157.375	157.375	DUPLEX Correspondence channel
28		157.400	162.000	DUPLEX Correspondence channel (Shannon)
	88	157.425	157.425	DUPLEX Correspondence channel
37/37M		157.850	157.850	Marina channel

Appendix B – Table of Abbreviations

AAIC	Accounting Authority ID Code
CH	Channel
CRS	Coastal Radio Station
DF	Direction Finding
DSC	Digital Selective Calling
EHF	Extremely High Frequency
EPIRB	Emergency Position Indicating Radio Beacon
FCC	Federal Communications Commission
GHz	Giga Hertz
GMDSS	Global Maritime Distress Safety System
GPS	Global Positioning System
GT	Gross Tonnage
HF	High Frequency
IMO	International Maritime Organisation
ISA	Irish Sailing Association
ITU	International Telecommunication Union
KHz	Kilo Hertz
LF	Low Frequency
LNB	Low Noise Block
LOS	Line of Sight
MF	Medium High Frequency
MHz	Mega Hertz
MID	Maritime ID Digits (Ireland 250)
MMSI	Maritime Mobile Service Identifier
MRCC	Maritime Rescue and Coordination Centres
MRSC	Maritime Rescue Sub Centre
MSI	Maritime Safety Information
NAVTEX	Navigation Text
nM	Nautical mile
NWAC	National Water Activities Centre
PTT	Press to Talk
R/T	Radio Transceiver
Rx	Receiver
SAR	Search and Rescue
SART	Search and Rescue Transponder
SHF	Super High Frequency
SOLAS	Safety of Life at Sea
SRC	Short Range Certificate
Tx	Transmitter
UHF	Ultra High Frequency
VHF	Very High Frequency
VLF	Very Low Frequency
W	Watt

Appendix C – Irish Coast Guard, Communications Network