National Coastwatch Institution

EYES ALONG THE COAST

FLEETWOOD TRAINING MANUAL

PART 10

RADIO COMMUNICATIONS

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PART 10

RADIO COMMUNICATIONS

INTRODUCTION

Most leisure boaters buy a two-way radio so they can call for assistance should they need to, but the radios are used for many other purposes: communicating with other vessels, talking to the coastguard, asking for a berth at a marina or even checking with the local NCI station to ascertain the current weather.

For these purposes a Class 'D' marine radio with Digital Selective Calling (DSC) is most appropriate and provides vessels operating in coastal waters with the facilities required.

Larger sea going vessels have two-way radios which operate on different wavebands with greater range, giving them contact from further afield. These are often Class A or B marine radios.

There are many makes of Class 'D' marine radios and although they may have different methods of operation they all carry out the same tasks. They operate on the FM frequencies of 156.0500MHz to 163.025 MHz on preset numbered channels. There are also hand-held marine radios which operate on the same frequencies but may not always have all the features of the larger sets.

Rossall Point uses **'Watchkeeper Reference Cards'** to guide operators through the correct procedures for the safe and efficient operation of the equipment.

OPERATING A MARINE VHF RADIO

It is very difficult to generalise about VHF marine radios as each make and model is different and there is certainly no such thing as a 'standard' control panel. There are, however, a number of generic controls which have to be included by international agreements and protocols.
It is emphasized that the operation of these controls will vary from set to set. You must study the manual for the set(s) installed locally and familiarize yourself with their operation.

Basic Radio Controls

- **Power on/off**. This is a press-button on our Sailor radios and is combined with the Volume control.

- **Volume Control**. This is a rotary knob which is turned clockwise to increase volume.

- **Squelch**. The squelch control is used to suppress receiver and environmental noise (White noise) which is extremely distracting and annoying. However, be careful not to turn it up too much or distant and faint transmissions will be lost. It should be set to just cancel out the noise. The squelch noise can be used to assist in setting the volume as part of the switch-on procedure.

- **Power Output**. The majority of Marine VHF radios have both high power (25 watts) and low power (1 watt) outputs. Low power must always be selected unless High power is needed for distress or long range communication

- **Press to Transmit (PTT)**. When the PTT switch on the microphone is depressed you can speak but not listen. Release it after speaking to hear the reply.

- **Channel Selector**. This is in the form of a rotary knob and may also be used to control the brightness with a press and turn motion.

- **Softkeys.** As with many today the Sailor radio employs 'SOFTKEYS' to select items/actions from a software driven menu system:

    - **HI/LO.** Enables the selection of High or Low power.

    - **Watch**. Enables Dual watch to monitor Ch16 (the distress and calling channel) and one other selected channel. The receiver is switched to monitor the selected channel but, when transmission is detected on Ch16, it automatically switches over, reverting to the selected channel when the transmission ends.

    - **Pos.** Enables the input of a position manually if not connected to a GPS system. **NOT TO BE USED at Rossall Point.**

    - **More.** Provides access to further menu items. **NOT TO BE USED at Rossall Point by the watchkeepers**

Switch On Procedure

When switching on the marine radio the following procedure should be followed:

- Switch on
- Adjust the Squelch to hear the background hiss (White noise)
- Adjust the volume whilst listening to the background hiss
- Adjust the squelch to just eliminate the background hiss
- Select the required channel
- Ensure the power is set to ‘Low’.

Designated Channels

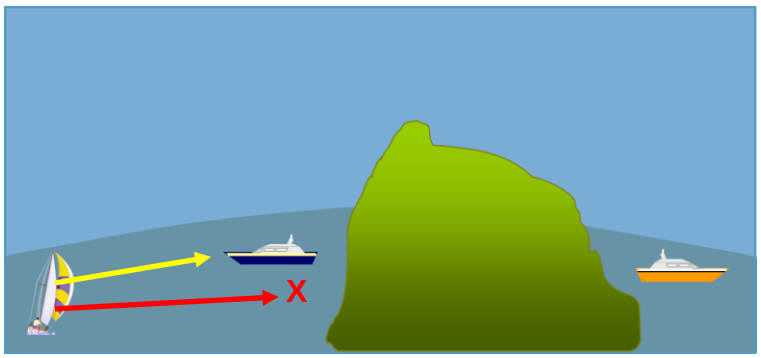
It is important to have a good understanding of the radios and channels that are required to be monitored by the NCI in the station, in particular;

- How to set up each radio to give optimum reception
- how to set the channels designated by the NCI.
- how to manually select a channel on each type of station radio.

It is a requirement of Declared Facility Status (DFS) that certain channels are always monitored. This is dealt with separately in the chapter VHF Listening.

RADIO WAVES & RANGE

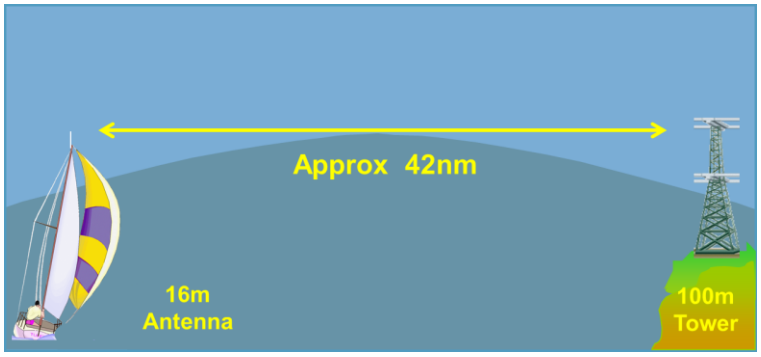
Class D marine radios operate in the Very High Frequency (VHF) waveband using Frequency Modulation (FM). Radio waves in the VHF waveband travel in straight lines in the same way as light and at the same speed ($3x10^8$ metres per sec). It follows that they can be stopped by other objects. A popular response to the range question is 'if you can see it you can talk to it' (known as **line-of-sight - LOS**) and this is generally a good guide.



Remember however that the radio signal comes from the radio antenna (not the radio itself) and therefore using a higher antenna allows the radio to 'see' further. A simple guide of range is shown below.

The square root of the height of the antenna x 3 = approx range of that mast.

The approximate range between 2 stations is calculated by adding the 2 ranges together for combined range.



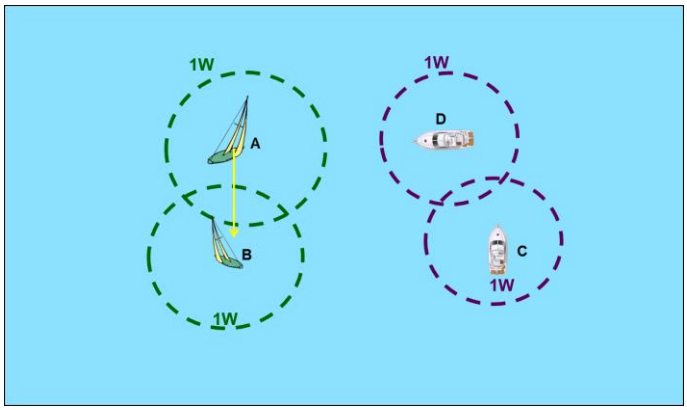
HIGH/LOW POWER

When the radio is turned on, 25 watts is often automatically selected. Similarly, 25 watts may be automatically selected after changing to certain channels (Ch16). This should be changed to 1 watt before transmitting in order to reduce interference with other communications on the same frequency.

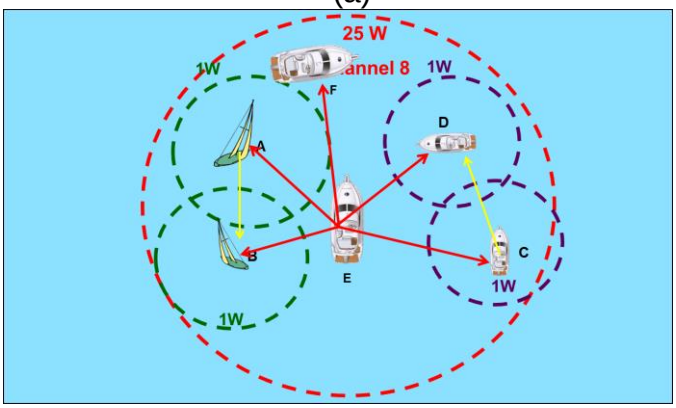
Only switch to 25 watts if your message is not received on 1 watt and it is important that it gets through.

In diagram (a) vessels A & B and vessels C & D are holding independent conversations on the same channel using 1 watt of power.

In diagram (b) vessel E is transmitting, also on the same channel, to vessel F using 25 watts and is overpowering the conversation of the other 4 vessels



(a)



(b)

The general directive is use 1 watt unless you need 25 watts.

Marine hand-held radios generally can choose to operate on 1 or 5 watts.
Handheld DSC radios can choose to operate on 1 or 6 watts.

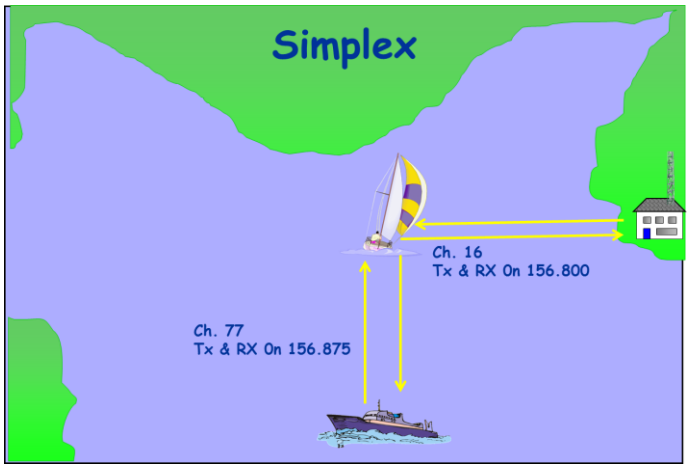
CHANNELS AND FREQUENCIES

Radio does not recognise geographic or political boundaries, and to ensure that vessels travelling on international voyages can always communicate, the VHF marine band is the same the world over. There are 56 internationally agreed marine channels using FM frequencies between156.0500MHz and 163.025 Mhz.

There are also 32 private channels allocated on a local basis to government and commercial organisations, including HM Coastguard which has a private channel on 156.000MHz (Ch. 0). Channels and frequencies are allocated in the UK by Ofcom.

The USA and Canada employ a slightly different application of marine channels, using the same frequencies but allocating more simplex rather than duplex channels.

The marine channels consist of two types, simplex and duplex, with designated channels internationally reserved for specific purposes.



Simplex channel

A simplex channel uses one frequency for transmitting and receiving.

In the diagram above the yacht is talking ship to ship with the larger vessel on channel 77 which has one frequency 156.875 MHz This is a simplex channel as is Channel 16 which has a frequency of 156.800 MHz.

This means that transmission has to cease before a message can be received. Only one person can talk at a time so it is necessary to inform the other party that you have finished transmitting and await their reply by saying “Over”.

Duplex allows for communication in both directions at the same time. It requires two transmitters and two receivers i.e. one transmitter and one receiver at each end of the communications link.

Duplex channel

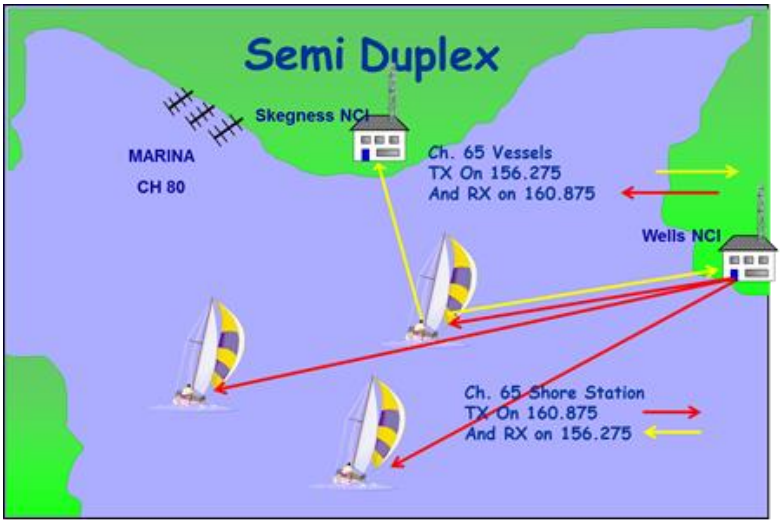
A duplex channel Is allocated two separate frequencies, one for the transmission A to B and one for the receipt direction B to A.

The most common usage is for hands-free communication such as in a cliff rescue. The rescuing officer can use an open microphone to transmit his actions whilst at the same time receiving advice from another authority.

Semi Duplex

Where duplex channels are employed on the Marine network they are mainly operated as Semi Duplex and marine radios are configured accordingly.

When the PTT button is depressed the radio switches to the transmit frequency and when it is released it reverts to the receive frequency. They are mainly used for ship to shore operations and the shore stations radios are configured with reversed frequencies.



In the diagram above vessels transmit on the yellow frequency (156.275) and receive on the red one (160.875).

The Shore stations transmit on the red frequency and receive on the yellow one.

It is important to understand that even if all vessels are on the same duplex channel they will not receive each other's transmissions as they are listening on another frequency.

Similarly Shore stations will not receive each other's transmissions.

It is essential that NCI watch keepers understand this concept as Channel 65, the NCI working channel, is a duplex channel. This is the reason we have a separate radio for channel 65 as it is configured as a shore station show "65 REV" (channel 65 reversed)

Channel 80 used by UK Marinas is also a duplex channel.

COMMUNICATIONS SECURITY (COMSEC)

All messages received on VHF radio are strictly confidential. Any relevant information should be recorded in the station log, and if necessary be given to your relief watchkeeper, but under no circumstances should it be passed to an outside body – either verbally or in writing.

VHF TRANSMITTING PROCEDURES

One of the most important aspects to remember is that others may be listening when a NCI watchkeeper transmits. Therefore, you are representing NCI standards and practices whenever you speak on the radio. Transmissions must, accordingly, be of the highest standard and only recognised radio procedures should be used.

Another important aspect is that there are many vessels wanting to use the radio and there are very few channels available. In general, all transmissions should be as crisp and short as possible. They should be:

Accuracy: Ensure you have the information required and it is accurate.

Brevity: Avoid repetitions, pleasantries etc. Only use the radio for maritime purposes - Use as little air time as possible

Clarity: Ensure you know what you want to say and it is in a recognized logical manner

VOICE PROCEDURE AND RADIO DISCIPLINE

Basic Guidelines

- Listen before you transmit to make sure you will not interfere with another call.
- Think before you speak **-** plan what you are going to stay.
- Use the microphone correctly **-** a fist mike should be held about 3 – 4 inches from the mouth, but slightly to one side.
- Speak normally, or raise your voice slightly but don't shout. Try to speak at a normal, flowing speed. If you have a particularly high or low pitched voice, or a pronounced accent, try to moderate it.
- A good transmission relies on regular and concise speech and can be summed up thus**:**

Rhythm: Speak in a moderate rhythm, as you would in normal conversation.

Speed: Speak at a regular speed, not too hurried and not too slow.

Volume: Volume should be normal speaking voice with no shouting and certainly not in a whisper. Too loud and the microphone being used will overload making your transmission crackle and probably unreadable

Pitch: A higher pitch voice carries far better than a deep low monotone voice that can be almost unintelligible. This is why the female voice carries better

So remember – R. S. V. P !

The Use Of Names/Callsigns

When beginning a call;

- Give the Name/Callsign of the station you are calling, up to 2 times depending on the circumstances. Only single use of the callsign is required after initial contact
- followed by the procedure words "THIS IS"
- then your own Name/Callsign
- finally, the word "OVER" indicating that you are about to stop transmitting and will be awaiting a reply.

A typical call and response is as follows:

"Holyhead Coastguard, Holyhead Coastguard, this is Rossall Point NCI, Rossall Point NCI over"

Note the called station is announced first with caller's ID Second

HMCG Holyhead should then reply:

"Rossall Point NCI this is Holyhead Coastguard, over".

Thereafter single identifiers must be used every time the PTT button is depressed during the rest of the radio conversation.

A call finishes when one of the parties uses the pro word “OUT” at the end of a transmission indicating that a reply is not expected.

The expression “Over and Out” is mutually exclusive and is not be used

Procedure For Unanswered Calls

If you hear a call that is clearly intended for you, but don’t catch the name or call sign of the station calling, then reply by substituting the words “station calling” for the unheard call sign.

If your call goes unanswered then, according to the radio regulations, you should wait two minutes before the next attempt and only try three times before waiting a further 3 minutes before beginning another 3 attempts.

Control Of Communications

In all cases where NCI Stations transmit to or receive calls from HMCG, the latter should be regarded as being in control of the communication.

Rules Of The Road

The most important rules set out in the Radio Regulations are known as the ‘*Ten Commandments’*. Most will not apply to NCI operators, but it is useful to be aware of them. They state that ‘*thou shall not’*:

- Transmit, unless qualified to do so unless you are being supervised by a qualified operator.
- Transmit false or deceptive distress or safety signals.
- Transmit without identification (call sign).
- Shut down a marine radio before finishing all operations resulting from a distress, urgency, or safety call.
- Broadcast i.e. transmit a message without specifying who it is intended for and without expecting a reply, other than distress messages.
- Transmit music.

- Make unnecessary transmissions.
- Transmit profane, indecent or obscene language.
- Use unauthorized frequencies.
- Transmit messages intended to be received ashore, other than by a licensed coast radio station.

The Phonetic Alphabet

The International Phonetic Alphabet is used universally at sea, in the air and for all radio and telephonic communications where individual words need to be spelled out.

It is important therefore that every watchkeeper can spell words and articulate numbers fluently using the system in the table below.

Phonetic Alphabet			
Alpha	Kilo	Uniform	0 Zero
Bravo	Lima	Victor	1 Wun
Charlie	Mike	Whiskey	2 Two
Delta	November	X ray	3 Three
Echo	Oscar	Yankee	4 Fower
Foxtrot	Papa	Zulu	5 Fife
Golf	Quebec		6 Six
Hotel	Romeo	. Decimal	7 Seven
India	Sierra	. Stop	8 Ait
Juliet	Tango	/ Diagonal	9 Niner

NOTE

0 - is spoken

"ZERO" never 'nought' or 'Oh'

Any number with a decimal point the word "DECIMAL" should be used

Any sequence of number (e.g. 375), will be transmitted as "THREE SEVEN FIFE" not 'three hundred and seventy five'.

24-Hour Clock

The 24-hour clock is used in all maritime communications.

The Coastguard always uses Universal Time Constant (UTC) which effectively is the same as Greenwich Mean Time (GMT).

British Summer Time (BST) is one hour ahead.

Although extremely unlikely, unless used by mistake on a marine channel, you may hear the aviation or military use of 'Zulu' (UTC/GMT) or 'Alpha' (GMT+ 1 hour/BST).

NCI main contacts are with the public, so NCI uses 'Local' time (GMT or BST) during its daily operations. In radio contacts with other bodies it is important to ensure that times are qualified as; Local, BST, GMT, UTC or Zulu, as appropriate.

Prowords (Procedure Words)

The most common and important prowords used in routine R/T procedures, are as follows.

ACKNOWLEDGE	Let me know that you have received and understood this message.
ALL BEFORE or ALL AFTER	Used when part of a message needs to be repeated EG: say again all after …
AFFIRMATIVE	Means **Yes**
CLOSING DOWN	Used when a station, or mobile is closing down and will no longer be on listening watch;
CORRECT	Correct is used when someone has read back all or part of a message to confirm that it is correct: See "Wrong" below
CORRECTION	An error has been made in this transmission. The correct version is...
FIGURES	Numerals follow….
GO AHEAD	Used to indicate they are ready to receive a message
IMMEDIATE	An urgent message to follow
I SPELL	Prefixes any spelling by phonetic alphabet;
NEGATIVE	No
OVER	I have completed my message and awaiting a reply from you
OUT	I have completed my message/transmission and am not expecting a reply.
PRIORITY	See Immediate
RADIO CHECK	Please report the strength and clarity of my radio signal
READ BACK	Please read back the message just passed to confirm correct
ROGER	Message received and understood
RECEIVED (or COPIED)	I have received and understood your message

SEELONCE MAYDAY	Maintain radio silence unless you are involved in the current or another mayday
SEELONCE FEENEE	The restrictions on transmitting are now lifted.
REPEAT	Used when asking for repetition of message or part of message
(I) SAY AGAIN	(I repeat) please repeat what you have just said
STAND BY	Stand by and do not make any further transmissions until the called station calls you
STANDING BY	Standing by for further messages/transmissions
STATION CALLING	Used instead of call-sign or vessel name when you could not identify caller
TEXT	Used as a message prefix when the message just about to be passed needs to be written down by the recipient and relayed to someone else.
THIS IS	Used when identifying yourself/station at the commencement of a call or exchange of messages.
TRAFFIC	General term for radio communication
WAIT - OUT	Normally used when an immediate answer is not available, and the addressee station needs to call you back with an answer. Also used if you inadvertently speak over someone else's transmission the base will instruct you to WAIT.
WORD after or WORD before	Used when repetition of a single unidentified word in a message is required
WRONG	Used when your last transmission or part of that transmission has been misheard ("Incorrect" may be misheard as "correct")

COMMONLY USED R/T ABBREVIATIONS

E.T.A – Estimated time of arrival
E.T.D - Estimated time of departure
OPS - Operations
R.T.C – Road Traffic Collision
R.T.B - Return to base
SITREP – Situation report
N.F.A – No Further Action
P.O.B – Persons on Board
P.V – Persons Visible

Radio Checks

There are various agency-specific responses to radio checks involving alpha-numeric codes. NCI operators need only reply, or expect to receive the signal STRENGTH and voice CLARITY examples include:

- Loud and Clear
- Good and Readable
- Weak but Readable
- Broken and Unreadable

The Call

'Holyhead Coastguard, Holyhead Coastguard, this is Rossall Point NCI, Rossall Point NCI radio check, over'

'Rossall Point NCI this is Holyhead Coastguard, you are loud and clear, how me, over'

'Holyhead Coastguard this Rossall Point NCI, you are good and readable, Rossall Point NCI, out'

Summary

When making radio transmissions remember:

Accuracy
Brevity
Clarity

Rhythm
Speed
Volume
Pitch