

Advantages of Preservation of Obligatory Voice Communication on the VHF Radio Channel 16

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Channel 16 of the VHF radio band is the most commonly used way of communication between vessels. Although there are strict rules not to use it for routine communication, many officers neglect them. When Digital Selective Calling had been presented to the GMDSS system, it was no longer obligatory to keep a watch on channel 16, however, on the waters of the United States such an obligation is still in force. Officers find DSC system quite difficult to use so the European countries should revise their politics and consider restoration of obligatory watchkeeping on channel 16.

1 VHF RADIO USAGE ACCORDING TO INTERNATIONAL CONVENTIONS

1.1 SOLAS obligations for VHF radio equipment

The SOLAS 74/02 Convention states that each vessel of Gross Tonnage 300-500 should carry at least 2 VHF radios while every passenger ship and every cargo vessel of Gross Tonnage more than 500 should carry at least 3 VHF radios on board (SOLAS, 2006). VHF radios should not only be present at the bridge, but also be properly situated. Headset should be in the vicinity of officer's hand and the speaker near his ears. Ship's wings should also be fitted with VHF radio equipment to be use in emergency situations or simply during manoeuvres.

The SOLAS states that there should be at least 2 separate ways to communicate in distress situation. One of them is always VHF radio, since it is obligatory to carry it when ship is operating in the A1 Sea Area and so in all other areas (ALRS 5, 2007/08).

VHF equipment consists not solely of a speaker and a headset. It is permanently connected to the Digital Selective Calling device operating also in the VHF band. The DSC device is capable of sending and receiving DSC messages. The messages are sent with a usage of 156.525 MHz frequency (channel 70). Monitoring on the VHF frequencies should be continuous on the DSC channel 70 and broadcast channel 16. SOLAS requires VHF radios to send and receive communication on frequencies 156.300 MHz (channel 6), 156.650 MHz (channel 13), 156.800 MHz (channel 16) as in Table 1 (ALRS 5, 2007/08).

Table 1. VHF radio channels required by the SOLAS

Channel	Frequencies (MHz)		Special purpose
	ship	shore	
6	156.300		SAR communication
13	156.650	156.650	Safety of navigation
16	156.800	156.800	International distress, safety and calling
70	156.525	156.525	DSC

1.2 STCW obligations for VHF radio users

VHF radio operators should have proper GMDSS qualifications (Walczak, 1996). At least the General Operators Certificate (GOC) should be held by the officer who is keeping a navigational watch on a bridge and uses the GMDSS equipment. The STCW Code (STCW Code, 2001) states, that the radio watch shall not be disturbed by any communication not connected with safety of ship and navigation so any routine or private communication during watch is forbidden.

2 ADVANTAGES OF THE VHF BAND

2.1 VHF range

English "VHF" abbreviation stands for Very High Frequency and it describes those waves of the electromagnetic spectrum which length is a multiplicity of meters. We can easily describe electromagnetic waves as a self-propagating radiation. The term "propagation" explains how the radio waves behave in a vacuum or in a matter when they are transmit-

ted. The propagation may be affected by many phenomena like refraction or absorption.

Of all the ways that the electromagnetic waves can propagate, those which are attached to the VHF band (30 MHz to 300 MHz) propagate in an accurate, but somewhat short way – with a use of a direct mode or a "line-of-sight" mode. The term comes from the fact that a VHF frequency wave propagates between antennas that are visible to each other. It is not exactly true, because of the air humidity and an effect of refraction, the VHF propagation is somewhat farther than the line-of-sight and is assumed to be more or less 30 Nm (Czajkowski, 2002).

It is rather an advantage than a disadvantage that VHF waves propagate in a circle of only 30 Nm from the sending station. Thanks to that fact a sender might be sure that his message will be sent only to stations in his line-of-sight and only those, who are really concerned about his message, will get it.

2.2 VHF channels

In maritime radio communication the wave-bands are marked by the letters. The maritime VHF band range is between 156 MHz and 174 MHz and is marked by letter "V". In that range of frequencies separate channels have been divided. The separation between channels is usually 25 kHz with an exception for 12.5 kHz division if local authority finds such a division necessary (ALRS 5, 2007/08). To make the usage of VHF channels easier, they have been marked with 2 digits. Instead of entering a long numbered and hard-to-remember frequencies (like in the MF/HF devices) user can simply enter 2 digits and the VHF radio will be tuned to the proper frequency.

2.3 The VHF communication rules

Finding usage of the VHF radio so easy makes it the most practicable tool for marine communication in the world. VHF radios are user-friendly devices, similar to cell phones, which are nowadays used by almost everyone. A well qualified user (e.g. a holder of the GOC certificate) should have no problem with VHF voice communication. He simply needs to know some basic rules, implemented in the "Seaspeak", Standard Marine Communication Phrases (SMCP), International Code of Signals and Admiralty List of Radio Signals. Basic rules e.g. implemented in the "Seaspeak" are:

- don't make unnecessary calls,
- use proper procedures,
- use proper channel,
- speak slowly and fluently,
- avoid disturbance of other calls (Weeks, 1984).

If the officers would follow these rules there shouldn't be any problems or mistakes in the VHF communication. Unfortunately, maritime courts often find misuse of the VHF radio as a cause of a collision or a marine accident. VHF radio equipment cannot be blamed for that. Its usage is so easy that the only ones to blame are the officers themselves. Among the typical mistakes they make are:

- not applying to communication rules of the SMCP and "Seaspeak",
- language mistakes, especially those caused by little English knowledge,
- wrong identification of vessels, e.g. not using names, call signs, MMSI numbers,
- keeping conversation on channel 16 or channel restricted for VTS communication.

Little English knowledge is becoming a problem. Since many maritime schools and training centres lowered their requirements for the candidates for future officers the level of education has also been lowered. They rarely follow SMCP and "Seaspeak" rules and when the rules are disobeyed it may lead to a disaster. The "weakest chain" in the maritime communication system is again the "human factor".

As it was already said the VHF radio equipment is easy to handle. However, when it comes to the DSC VHF system, which is connected to the voice-broadcast VHF device, it becomes much more complicated.

2.4 Digital Selective Calling on the VHF band and its disadvantages

Digital Selective Calling was introduced to the GMDSS system on MF, HF and VHF bands. It was intended to make easy, automatic communication with shore stations and other vessels. DSC device can either send automatic messages, like distress message (by simply pushing a "distress" button for 5 sec.) or recently prepared messages by the officer in charge of a navigational watch. The preparation is done only by choosing (Czajkowski, 2002):

- format specifier (distress, individual, geographical area, all ships, groups),
- MMSI number of the receiving station (not necessary if the message is addressed to "all stations"),
- proper category (from listed: distress, urgency, safety and routine),
- special information (e.g. about nature of distress, from listed: piracy, sinking, listing, fire on board, etc.).

So it is not possible to send a typed message, like a cell phone's SMS.

The DSC system works perfectly well when it comes to a distress message. The only thing the operator needs to do is push the right button for a fixed amount of time and the message will be sent automatically. The user problem appears when it comes to preparation of a more complicated message. The DSC equipment panel is not as user-friendly as was the VHF voice communication device. In fact is rather user-unfriendly system. The ITU Regulations are very complicated and it is difficult for an officer to remember when he can and when he cannot send confirmation of a distress. Preparing a message is also quite difficult, especially with a device's display consisting of two lines of black and white text. People who nowadays work on the Personal Computers (PC) which has big, colourful screens, with wide windows and easy-to-choose options, find DSC equipment somehow old-fashioned. Officers are often afraid to use the DSC equipment because they don't comprehend all the rules and the device itself.

In the times when there are 3.3 billion operating cell phones in the world and thus every second man on the planet has a cell phone (Kobel, 2007), wouldn't it be easy to change DSC messages into user-friendly SMS system like the one in the GSM net?

2.5 DSC watch keeping obligation

The SOLAS convention states that monitoring on the VHF frequencies should be continuous on the DSC channel 70 and broadcast channel 16, however, in special areas, like VTS, local authorities can recommend their own broadcast channels for watch keeping.

DSC was intended to eliminate the need of keeping continuous watch on radio receivers on voice radio channels, including VHF channel 16. After 1 February 1999, according to SOLAS, every ship had to keep continuous watch on channel 70 simply with having such a device on board. The DSC receiver works automatically - when a message comes a buzz-signal is sound. The officer simply needs to push appropriate button, read the message and tune the radio to the right VHF voice channel (recommended in the message itself) and wait for the communication to come.

Thanks to the DSC system it is certain that the recipient will receive the message because the message is stored in the device and can be read in any time. That's the main advantage of the DSC system. With voice communication, when officer is busy and cannot lift the headset, the message broadcasted by voice might not be received. DSC message comes whether he likes it or not – it is stored in the device, just like SMS message is stored in a cell phone. To make the sending station sure that the message

came, receiving station can send a confirmation (however it is forbidden to send such a DSC confirmation to a distress message from a ship, because then the message might not get to the appropriate SAR station).

3 VHF COMMUNICATION ON CHANNEL 16

3.1 Legal issues concerning channel 16

Despite the above mentioned advantages of DSC system it is still practised to keep a listening watch on the VHF channel 16. It is a good seamanship to do so and here it is where the rules are not complying with the practise. SOLAS convention states in chapter IV/12 that “*Ships 300 tons and over and passenger ships on international voyages must maintain, where practicable, a continuous listening watch on VHF channel 16 until 1 February 2005*” (SOLAS, 2006). In May 2002, IMO decided to postpone cessation of a VHF listening watch aboard ships until 1 February 2005. In ITU Regulations there is a statement: “*All ships should, where practicable, maintain watch on channel 16 when within the service area of a VHF maritime coast station (ITU, RR 38-16)*”. So there is no longer strict obligation to do so. The statement “where practicable” in both SOLAS and ITU Regulations might be read as an admittance for not listening to the channel 16. For example, in places where both VTS and harbour master are using channels different than 16 (e.g. in Gdynia harbour ships are listening to channel 71 for VTS Zatoka and 12 for Gdynia harbour master), a ship with two VHF radios may not listen to the 16 channel at all.

The problem comes with a small pleasure crafts, fishing vessels and sailing vessels, with low-qualified crew, who are often not listening to the VTS channels or 16 channel or are absolutely disobeying the Rule 5 of the COLREGS “Look-out” (like the skipper of “Our Sarah Jayne” the case of which is described in the next chapter of the paper).

When a disaster comes, because of not listening to 16 channel and not responding to a call, the captains of such vessels might afterwards explain themselves that they were not obliged to do so. The communication between vessels would be much easier if there was still an obligation to listen to the 16 channel. Not “where it is practicable” but everywhere, e.g. with a usage of the “dual watch” availability of the VHF radio.

Such a problem does not exist in the United States because the US Authority - Federal Communications Commission - stated that “*any vessel equipped with VHF marine radiotelephone must maintain a watch on channel 16, whenever the radiotelephone is not being used to communicate*” (FCC:

Title 47). The usage of word "must" grants that officers will keep a watch on channel 16.

3.2 Using "dual channel" option

Thanks to the common sense of the officers and "dual channel" options of the VHF radios the watch on the channel 16 is still kept. "Dual channel" is an option included in the VHF radio device which enables to listen to two channels in the same time – e.g. channel one for 1 sec. and the other, main, for 9 sec. When a message comes or any voice signal on one of those channels is received the receiver tunes itself automatically to that channel.

It's a very useful tool to use especially on those ships which are equipped only with 2 VHF radios (vessels of GT less than 300) or vessels which are carrying radios voluntarily because they are too small to take part in the SOLAS convention. Those small vessels, most of which are pleasure crafts, are usually carrying VHF radios and for them it is the only way of communication.

4 PROBLEMS WITH DISOBEYING COMMUNICATION RULES

4.1 *Disobeying the Rule 5 "Look-out" of the COLREGS.*

The Rule 5 states that "every vessel shall at all times maintain a proper look-out by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision", VHF radios are one of those mentioned as "all available means" (Rymarz, 2004).

So not only SOLAS and ITU-R but also the Collision Regulations demands keeping a watch with using VHF radio (even if it is stated as "all means").

Disobeying the rules may lead to a collision. The officer had to be focused on all aspects of the navigation. He needs to have a whole view of the situation. To keep his full attention he needs to maintain proper look-out and "proper" means "full". If in any case he is not sure of what is going on he must have an always ready-to-use tool to solve the situation. VHF radio is such a tool and it's proper usage can be as simple as keeping watch on channel 16.

If the officer neglects usage of that tool he may cause a marine accident, just like the "Our Sarah Jayne's" skipper did.

4.2 *Collision between "Thelisis" and "Our Sarah Jayne" as a result of disobeying Rule 5.*

On 20 June 2001 in the Thames Estuary two vessels collided. One of them was the 8904gt Greek-registered ro-ro cargo vessel "Thelisis" and the other was small registered fishing vessel "Our Sarah Jayne" which was only 14m long. At the time of the collision "Thelisis" was under pilotage and "Our Sarah Jayne" was engaged in fishing (MAIB, 2002).

"Thelisis" was plying through Princess Channel and spotted a white light in front of her bow. Both pilot and the master were not sure of the source of the light. The pilot called VTS to receive information on the object, but the VTS operator also didn't know what it was. When the range between ships was around 1Nm "Thelisis" recognised the object as a fishing vessel and tried to call him on VHF channel 12, the channel which was used by the Thames VTS in the area. Because of wrong identification first he came into communication with other vessel and started to agree manoeuvre. The pilot was sure that the fishing vessel would give way and she did not.

"Our Sarah Jayne's" skipper was not aware of the imminent danger until the collision took place. That was because he was completely disobeying the Rule 5 and was not keeping any look-out at all. He had his VHF radio on and tuned to VTS' channel 12, but the volume was set midway. He left the wheelhouse unattended many times and probably didn't hear any calling and even if he did heard them he was not aware that he was the one referred to.

"Our Sarah Jayne" flooded then foundered almost immediately after the collision. The skipper was rescued by a Thames pilot cutter.

5 CONCLUSIONS

Since VHF radio is such a useful tool and neglecting it might be so dangerous the Authorities should encourage deck officers to use it. The channel 16 should be on at all times and a continuous watch should be kept. DSC communication is helpful but it shouldn't be the only recommended way of communication because of it's disadvantages mentioned in the paper. Mostly because DSC devices are complex and not at all user-friendly. If the local authorities require keeping a watch on different channels then the "dual watch" option should be used or even another VHF radio installed onboard. The international regulations should again expect the officers to keep a channel 16 watch, like it is practicable on the United States waters.

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