

Marine VHF radio

Marine VHF radio is a worldwide system of two way radio transceivers on ships and watercraft used for bidirectional voice communication from ship-to-ship, ship-to-shore (for example with harbormasters), and in certain circumstances ship-to-aircraft. It uses FM channels in the very high frequency (VHF) radio band in the frequency range between 156 and 174 MHz, inclusive, designated by the International Telecommunication Union as the *VHF maritime mobile band*. In some countries additional channels are used, such as^[1] the L and F channels for leisure and fishing vessels in the Nordic countries (at 155.5–155.825 MHz). Transmitter power is limited to 25 watts, giving them a range of about 100 kilometres (62 mi; 54 nmi).

Marine VHF radio equipment is installed on all large ships and most seagoing small craft. It is also used, with slightly different regulation, on rivers and lakes. It is used for a wide variety of purposes, including marine navigation and traffic control, summoning rescue services and communicating with harbours, locks, bridges and marinas.



A standard handheld marine VHF, mandatory on larger seagoing vessels under the Hi rules



A VHF set and a VHF channel 70 DSC set, the DSC on top



A vintage (76-89) marine VHF radiotelephone

Contents

- Background
- Types of equipment
 - Voice-only
 - Digital selective calling
 - Automatic identification system
 - Text messaging
- Regulation
 - Automatic Transmitter Identification System (marine)
- Channels and frequencies
- Operating procedure
- See also
- References
- External links

Background

Marine radio was the first commercial application of radio technology, allowing ships to keep in touch with shore and other ships, and send out a distress call for rescue in case of emergency. Guglielmo Marconi invented radio communication in the 1890s, and the Marconi Company installed wireless telegraphy stations on ships beginning around 1900. Marconi built a string of shore stations and in 1904 established the first Morse code distress call, the letters CQD, used until 1906 when SOS was agreed on. The first significant marine rescue due to radio was the 1909 sinking of the luxury liner RMS Republic, in which 1,500 lives were saved. This and the 1912 RMS Titanic rescue brought the field of marine radio to public consciousness, and marine radio operators were regarded as heroes. By 1920, the US had a string of 12 coastal stations stretched along the Atlantic seaboard from Bar Harbor, Maine to Cape May, New Jersey.^[2]

The first marine radio transmitters used the longwave bands. During World War I amplitude modulation was developed, and in the 1920s spark radiotelegraphy equipment was replaced by vacuum tube radiotelephony allowing voice communication. Also in the 1920s, the ionospheric skip or skywave phenomenon was discovered, which allowed lower power vacuum tube transmitters operating in the shortwave bands to communicate at long distances.

Hoping to foil German detection during the World War II Battle of the Atlantic, American and British convoy escorts used Talk-Between-Ships (TBS) radios operating on VHF.^[3]

Types of equipment

Sets 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 antenna and a bigger display and buttons. A portable set (often essentially a waterproof, VHF walkie-talkie in design) can be carried on a kayak, or to a lifeboat in an emergency, has its own power source and is waterproof if GMDSS-approved. A few portable VHF's are even approved to be used as emergency radios in environments requiring intrinsically safe equipment (e.g. gas tankers, oil rigs, etc.).

Voice-only

Voice only equipment is the traditional type, which relies totally on the human voice for calling and communicating. Many lower priced handheld units are voice only as well as older fixed units.

Digital selective calling

DSC equipment, a part of the Global Maritime Distress Safety System (GMDSS), provides all the functionality of voice-only equipment and, additionally, allows several other features:

- The ability to call another vessel using a unique identifier known as a Maritime Mobile Service Identity (MMSI). This information is carried digitally and the receiving set will alert the operator of an incoming call once its own MMSI is detected. Calls are set up on the dedicated VHF channel 70 which DSC equipment must listen on continuously. The actual voice communication then takes place on a different channel specified by the caller.
- A distress button, which automatically sends a digital distress signal identifying the calling vessel and the nature of the emergency
- A built in GPS receiver or facility to connect an external GPS receiver so that the user's location may be transmitted automatically along with a distress call.

When a DSC radio is bought new the user will get the opportunity to program it with the MMSI number of the ship it is intended to be used on. However to change the MMSI after the initial programming can be problematic and require special proprietary tools. This is allegedly done to prevent theft.

Automatic identification system

More advanced transceiver units support AIS. This relies on a GPS receiver built into the VHF equipment or an externally connected one by which the transceiver obtains its position and transmits this information along with some other details about the ship (MMSI, cargo, draught, destination and some others) to nearby ships. AIS operates as a mesh network and full featured units relay AIS messages from other ships, greatly extending the range of this system; however some low-end units are receive only or do not support the relaying functionality.

AIS data is carried on dedicated VHF channels 87B and 88B at a baud rate of 9,600bit/s using GMSK modulation^[4] and uses a form of time-division multiplexing.

Text messaging

Using the RTCM 12301.1 standard it is possible to send and receive text messages in a similar fashion to SMS between marine VHF transceivers which comply with this standard.^[5] However, as of 2019 very few transceivers support this feature. The recipient of the message needs to be tuned to the same channel as the transmitting station in order to receive it.

Regulation

In the United States, any person can legally purchase a Marine VHF radio and use it to communicate without requiring any special license as long as they abide by certain rules, but in a great many other countries a license is required to transmit on Marine VHF frequencies.

In the United Kingdom and Ireland and some other European countries *Short Range Certificate* is the minimum requirement to use a marine VHF radio. This is usually obtained after completing a course of around two days and passing an exam. This is intended for those operating on lakes and in coastal areas whereas a *Long Range Certificate* is usually recommended for those operating further out as it also covers HF and MF radios as well as INMARSAT systems.

Automatic Transmitter Identification System (marine)

For use on the inland waterways within continental Europe, a compulsory Automatic Transmitter Identification System (ATIS) transmission conveys the vessel's identity after each voice transmission. This is a ten-digit code that is either an encoded version of the ship's alphanumeric call sign, or for vessels from outside the region, the ship MMSI prefixed with "9". The requirement to use ATIS in Europe, and which VHF channels may be used, are strongly regulated, most recently by the Basel agreements.




































Channels and frequencies

A marine VHF set is a combined transmitter and receiver and only operates on standard, international frequencies known as channels. **Channel 16** (156.8 MHz) is the international calling and distress channel. Transmission power ranges between 1 and 25 watts, giving a maximum range of up to about 60 nautical miles (111 km) between aerials mounted on tall ships and hills, and 5 nautical miles (9 km; 6 mi) between aerials mounted on small boats at sea level.^[6] Frequency modulation (FM) is used, with vertical polarization, meaning that antennas have to be vertical in order to have good reception. For longer range communication at sea, marine MF and marine HF bands and satellite phones can be used.




Half-duplex channels here are listed with the A and B frequencies the same. The frequencies, channels, and some of their purposes are governed by the ITU. For an authoritative list see.^[7] The original allocation of channels consisted of only channels 1 to 28 with 50 kHz spacing between channels, and the second frequency for full-duplex operation 4.6 MHz higher.

Improvements in radio technology later meant that the channel spacing could be reduced to 25 kHz with channels 60 to 88 interspersed between the original channels.







Channels 75 and 76 are omitted as they are either side of the calling and distress channel 16, acting as guard channels. The frequencies which would have been the second frequencies on half-duplex channels are not used for marine purposes and can be used for other purposes that vary by country. For example, 161.000 to 161.450 MHz are part of the allocation to the Association of American Railroads channels used by railways in the US and Canada.^[8] ^[9]

Channel number	Frequencies (MHz)		 <u>United Kingdom</u> ^[10]	 <u>United States</u>	 <u>Canada</u>	 <u>Australia</u>	 <u>New Zealand</u>	 <u>Finland</u> ^[1]
	 <u>Ship tx, usually</u>	 <u>Shore tx, usually</u>						
0	156.000	160.600	Private, coast guard 					
1	156.050	160.650		Ship-to-ship/shore, commercial and safety West Coast 	Public Correspondence (Ship-to-Shore full-duplex) BC Coast			Public Correspondence (Ship-to-Shore full-duplex) Port Operations
2	156.100	160.700			Public BC Coast			Public Correspondence (Ship-to-Shore full-duplex) Port Operations
3	156.150	160.750		 Illegal for public use ^[a]	Public BC Coast/Inland		Boat to Boat - Kawaii	Public Correspondence (Ship-to-Shore full-duplex) Port Operations
4	156.200	160.800			Ship-to-ship/shore, commercial and safety East Coast and Inland  Canadian Coast Guard - public working channel BC Coast ^[b] 		Boat to Boat - Tutukaka/Raglan	Public Correspondence (Ship-to-Shore full-duplex) Port Operations
5	156.250	160.850			Ship Movements			Public Correspondence (Ship-to-Shore full-duplex) Port Operations
6	156.300	156.300	Ship-to-ship + Ship-to-Air 		Ship-to-ship + Ship-to-Air 	Distress - Ship-to-Air	Working - Internship	 Ship-to-ship (commercial) also SAR: Ship-to-Ship-to-Air
7	156.350	160.950			General working channel			Public Correspondence (Ship-to-Shore full-duplex) Port Operations
8	156.400	156.400	Ship-to-ship 		Ship-to-ship East and west coasts, Lake Winnipeg 	Working - Internship	Working - Internship	 Ship-to-ship (commercial)
9	156.450	156.450	Frequently used by pilots 	Calling  commercial and non-commercial.	Ship-to-air for maritime support Atlantic and BC coasts 	Pilots, Port Operations	Port Operations	 VTS Ship-to-ship + Port Operations
10	156.500	156.500	Frequently used by HM Coastguard 		Ship-to-air - SAR and antipollution  General working - Atlantic and BC coasts, Great Lakes		Port Operations	 Ship-to-ship Port Operations also SAR and oil clean only VTS on Gulf of Finland
11	156.550	156.550	Port Operations		VTS - BC Coast Pilotage 		Port Operations	 Port Operations, at the Saimaa Canal lock
12	156.600	156.600	Port Operations	VTS - San Francisco offshore Pilotage 	VTS - BC Coast Port and pilot ops 	Port Operations, VTS	Port Operations	 Port Operations
13	156.650	156.650	Bridge-to-Bridge Working 	Bridge-to-Bridge safety  : Vessels > 20m must	VTS - BC Coast Bridge-to-bridge safety 	Port Operations, VTS	Internship Nav Safety	 Pilots Ship-to-ship Port Operations

				maintain watch, Tx limited to 1 watt. Movable bridge / lock operations.				
14	156.700	156.700	Port Operations	VTS - San Francisco Bay and Delta Pilotage A	VTS - BC Coast Port and pilot ops A		Port Operations	A Working channel for SAR authorities, Turkish Radio (Port Operations)
15	156.750	156.750	On board working (limited to 1 watt) A					A max 1 W Intraship Ship-to-ship Port Operations
16	156.800	156.800	International distress, safety and calling A All vessels equipped with VHF must maintain watch.					
17	156.850	156.850	On board Working A				Aquatic Sports Events	A max 1 W Intraship Ship-to-ship Port Operations
18	156.900	161.500						Public Correspondence (Ship-to-Shore full-duplex) Port Operations
19	156.950	161.550		Landside facilities: harbormaster, marinas.	Canadian Coast Guard - Working Channel			Public Correspondence (Ship-to-Shore full-duplex) Port Operations
20	157.000	161.600				Repeater Operations	Continuous Weather Maritime Safety Service	Public Correspondence (Ship-to-Shore full-duplex) Port Operations
21	157.050	161.650		A U.S. Coast Guard Only	Continuous marine broadcasts B (WX 8)		Continuous Weather Maritime Safety Service	Public Correspondence (Ship-to-Shore full-duplex) Port Operations
22	157.100	161.700		A U.S. Coast Guard—public working channel ^[e]			Continuous Weather Maritime Safety Service	Public Correspondence (Ship-to-Shore full-duplex) Port Operations
23	157.150	161.750	HM Coastguard Maritime Safety Information - Now on 62,63,64	A U.S. Coast Guard Only			Continuous Weather Maritime Safety Service	Public Correspondence (Ship-to-Shore full-duplex) Port Operations
24	157.200	161.800	UKSAR G/A Winching A UKSAR TWC B ^[d]					Public Correspondence (Ship-to-Shore full-duplex) Port Operations
25	157.250	161.850					Maritime Radio	Public Correspondence

							Working Channel	(Ship-to-Shore full-dup Port Operations)
26	157.300	161.900	HM Coastguard Maritime Safety Information	Public correspondence (marine telephone operator)				Public Correspondenc (Ship-to-Shore full-dup Port Operations)
27	157.350	161.950						Public Correspondenc (Ship-to-Shore full-dup Port Operations)
28	157.400	162.000						Public Correspondenc (Ship-to-Shore full-dup Port Operations)
31	157.550	162.150						
M1/37A	157.850	157.850	(As M1) Yacht clubs, race committees and marinas					
60	156.025	160.625						GOFREP on Gulf of Finland Public Correspondenc (Ship-to-Shore full-dup Port Operations)
61	156.075	160.675		 Illegal for public use ^[a]				GOFREP (Estonia) or of Finland Public Correspondenc (Ship-to-Shore full-dup Port Operations)
62	156.125	160.725	HM Coastguard Maritime Safety Information ^[d]				Boat to Boat - Waiheke/Whangaroa	Public Correspondenc (Ship-to-Shore full-dup Port Operations)
63	156.175	160.775	HM Coastguard Maritime Safety Information (half- duplex) ^[d]				Boat to Boat - Manukau	Public Correspondenc (Ship-to-Shore full-dup Port Operations)
64	156.225	160.825	HM Coastguard Maritime Safety Information (half- duplex) ^[d]	 Illegal for public use ^[a]				Public Correspondenc (Ship-to-Shore full-dup Port Operations)
65	156.275	160.875	National Coastwatch Institution (NCI) and Independent Coastwatch Stations (http://www.seasafetygroup.org) Working Channel for communication with local mariners for radio checks and local sea conditions. Effective 1 March 2021.		Marine Assistance Working Channel		Boat to Boat - Coromandel	Public Correspondenc (Ship-to-Shore full-dup Port Operations)
66	156.325	160.925			Marinas - BC Coast 			Public Correspondenc (Ship-to-Shore Duplex Port Operations)

67	156.375	156.375	UK Small Ship Safety Channel			Working Channel, Marine Weather	Maritime Radio Working Channel	A VTS (Ship-to-ship + Port Operations)
68	156.425	156.425		Non-commercial A			Maritime Radio Working Channel	A Port Operations, B Guard authorities, also some yacht c and marinas
69	156.475	156.475	Port Operations	Non-commercial A		Australian Navy	Maritime Radio Working channel Surf Lifesaving	A Ship-to-ship Port Operations
70	156.525	156.525	Digital Selective Calling A					
71	156.575	156.575	Port Operations	Non-commercial A			Maritime Radio Working Channel	A VTS (Ship-to-ship + Port Operations) Port Operations
72	156.625	156.625	Ship-to-ship A Frequently used by leisure craft	Non-commercial ship-to-ship A	Ship-to-ship			A Ship-to-ship Ship-to-air
73	156.675	156.675	HM Coastguard Safety Broadcasts Backup Small Ship Safety			Ship-to-ship	Marinas - Working	A Ship-to-ship Ship-to-air (Port Operations)
74	156.725	156.725	British Waterways/Canal and River Trust Channel (Canal and River System) Port Operations			Ship-to-ship	Working - Coast/Ship	A Port Operations
75	156.775	156.775	Navigation related communications (limited to 1 watt)					A Restricted Ship-to-ship Port Operations
76	156.825	156.825						A Restricted Port Operations
77	156.875	156.875	Ship-to-ship A			Ship-to-ship		A Ship-to-ship
78	156.925	161.525		Non-commercial A				Public Correspondence (Ship-to-Shore Duplex Port Operations)
79	156.975	161.575						Public Correspondence (Ship-to-Shore Duplex Port Operations)
80	157.025	161.625	UK Marina Channel			Repeater	Coastguard Radio -	GOFREP on Gulf of

						Operations	Working Channel	Finland Public Correspondenc (Ship-to-Shore Duplex Port Operations
81	157.075	161.675		 U.S. Government Use Only		Repeater Operations	Coastguard Radio - Working Channel	GOFREP (Estonia) or of Finland Public Correspondenc (Ship-to-Shore Duplex Port Operations
82	157.125	161.725		 U.S. Government Use Only	Canadian Coast Guard - Working Channel		Coastguard Radio - Working Channel	Public Correspondenc (Ship-to-Shore Duplex Port Operations
83	157.175	161.775		 U.S. Coast Guard Use Only	Canadian Coast Guard - Working Channel			Public Correspondenc (Ship-to-Shore Duplex Port Operations
84	157.225	161.825	HM Coastguard Maritime Safety Information - Now on 62,63,64				Coastguard Radio - Working Channel	Public Correspondenc (Ship-to-Shore Duplex Port Operations
85	157.275	161.875	UKSAR TWC (half-duplex) ^[d]		Radio Telephone - full duplex		Coastguard Radio - Working Channel	Public Correspondenc (Ship-to-Shore Duplex Port Operations
86	157.325	161.925	HM Coastguard Maritime Safety Information- Now on 62,63,64				Coastguard Radio - Working Channel	Public Correspondenc (Ship-to-Shore Duplex Port Operations
87	157.375	157.375						Public Correspondenc Port Operations
88	157.425	157.425						Commercial, Internshi only.
M2/P4	161.425	161.425	(As M2) Yacht clubs, race committees and marinas					
87B	161.975	161.975	Automatic Identification System  					
88B	162.025	162.025	Automatic Identification System  					
L1	155.500	155.500						Leisure activities. (Ship-to-ship) Use the Nordic cour and Estonia
L2	155.525	155.525						Leisure activities.

								(Ship-to-ship) Use the Nordic countries and Estonia
L3	155.650	155.650						Leisure activities. (Ship-to-ship) Use Finland and Norway
F1	155.625	155.625						Fishing. (Ship-to-ship) Use the Nordic countries
F2	155.775	155.775						Fishing. (Ship-to-ship) Use the Nordic countries
F3	155.825	155.825						Fishing, also recreational fishing (Ship-to-ship) Use the Nordic countries

- Some radios enable channels 3A, 61A, and 64A when configured for "USA mode" even though those channels are allocated exclusively for Public Safety use by the FCC. The frequencies 156.075, 156.150, and 156.225 MHz are used for interoperability communication by police and fire departments in many areas.
- CCG public operations moved from 22A to 04A to avoid interference from USCG stations in northern Washington state.
- Channel 22A is reserved for communication between the U.S. Coast Guard vessels and private vessels. The Coast Guard does not monitor 22A: Contact must first be established on 16.
- UKSAR land-based search and rescue teams have access to the half-duplexed versions of 24, 62, 63, 64, 85 for operational and training needs. These include mountain rescue teams in England, Wales and Scotland.

Operating procedure

Marine VHF mostly uses half-duplex non-relayed transmission. Ship to ship communication is over a single radio frequency, while ship to shore uses two frequencies, but typically only one of the parties can transmit at a time. (Not to be confused with simplex communication, for example radio broadcasting, where one party transmits always transmits.) The transceiver is normally in receive mode; to transmit the user presses a "push to talk" button on the set or microphone which turns the transmitter on and the receiver off. Some channels, however, are "duplex" transmission channels where communication can take place in both directions simultaneously when the equipment on both ends allow it.^[6] Each full-duplex channel has two frequency assignments. Duplex channels can be used to place calls over the public telephone network for a fee via a marine operator. When full-duplex is used, the call is similar to one using a mobile phone or landline. When half-duplex is used, voice is only carried one way at a time and the party on the boat must press the transmit button only when speaking. This facility is still available in some areas, though its use has largely died out with the advent of mobile and satellite phones. Marine VHF radios can also receive weather radio broadcasts, where they are available.

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

- Stations should listen for 30 seconds before transmitting and not interrupt other stations.
- Maintaining a watch listening on Channel 16 when not otherwise using the radio. All calls are established on channel 16, except for distress working switch to a working ship-to-ship or ship-to-shore channel. (procedure varies in the U.S. only when calls can be established on Ch. 9)
- During distress operations silence maintained on ch. 16 for other traffic until the channel is released by the controlling station using the pro-word "Silence Fini". If a station does use Ch. 16 during distress operations controlling station issues the command "silence mayday".
- Using a set of international "calling" procedures such as the "Mayday" distress call, the "Pan-pan" urgency call and "Sécurité" navigational hazard call.
- Using "pro-words" based on the English language such as *Acknowledge, All after, All before, All stations, Confirm, Correct, Correction, In figures, In letters, Over, Out, Radio check, Read back, Received, Say again, Spell, Standby, Station calling, This is, Wait, Word after, Word before, Wrong* (local language is used for some of these, when talking to local stations)
- Using the NATO phonetic alphabet: *Alfa, Bravo, Charlie, Delta, Echo, Foxtrot, Golf, Hotel, India, Juliett, Kilo, Lima, Mike, November, Oscar, Papa, Quebec, Romeo, Sierra, Tango, Uniform, Victor, Whiskey, X-ray, Yankee, Zulu*
- Using a phonetic numbering system based on the English language or a combination of English and Roman languages: *Wun, Too, Tree, Fow-er, Fife, Six, Sev-en, Ait, Nin-er, Zero, Decimal*; alternatively in marine communication: *unaone, bisso two, terrathree, kartefour, pantafive, soxisix, setteseven, oktoeight, novenine, nadazero*

Slightly adjusted regulations can apply for inland shipping, such as the Basel rules (de:Regionale Vereinbarung über den Binnenschiffsfahrtsfunk) in Western Europe.

See also

- 2182 kHz
- Automated Maritime Telecommunications System
- Maritime mobile amateur radio
- Radio horizon
- Ship-to-shore

References

1. "Kommunikationsverket 2010: *Handbok i VHF-radiokommunikation för radiooperatör med kusttrafikcertifikat*" (https://www.viestintavirasto.fi/attachments/Rannikkolaivurin_radioliikenneopas_SV.pdf) (PDF). Viestintavirasto.fi. Retrieved 16 February 2015.
2. Harbord, J.G. (1929). "The Commercial Uses of Radio". *The Annals of the American Academy*. doi:10.1177/0002716229142001S09 (<https://doi.org/10.1177%2F0002716229142001S09>).
3. "Radio Research Paper - World War 2 Naval Operations" (http://jproc.ca/rp/nro_ww2.html). *jproc.ca*. Retrieved 7 June 2022.
4. All about AIS (<http://www.allaboutais.com/index.php/en/technical-info/technical-fundamentals>)
5. RTCM 12301.1, Standard for VHF-FM Digital Small Message Services (<http://nebula.wsimg.com/08ac6f768a2ba3f85f01b41f5e19d1bc?AccessKeyId=2D3610E97C8E55B553AE&disposition=0&alloworigin=1>)
6. "MGN 324 Operational guidance on the use of radio and automatic identification systems" (<https://www.gov.uk/government/publications/mgn-324-operational-guidance-on-the-use-of-radio-and-automatic-identification-systems>). Gov.uk. Retrieved 16 February 2015.
7. Circular letter CM/19-E, International Telecommunication Union, 27 March 2009
8. "American Association of Railroads channel allocation" (<https://web.archive.org/web/20100920105428/http://arri-al.org/Railroad%20Communications%20Channels.pdf>) (PDF). Arri-al.org. Archived from the original (<http://www.arri-al.org/Railroad%20Communications%20Channels.pdf>) (PDF) on 20 September 2010. Retrieved 23 September 2013.
9. "U.S. VHF Channels" (<http://www.navcen.uscg.gov/?pageName=mtvhf>). Navcen.uscg.gov. Retrieved 16 February 2015.
10. Noice, Alison, ed. (2008). *VHF Radio (including GMDSS)* (2nd ed.). RYA. ISBN 978-1-906435-20-2.
11. MANUEL DE PREPARATION DU CRR MARITIME 2015 Agence nationale des fréquences (https://web.archive.org/web/20161007144151if_/http://www.anfr.fr/fileadmin/mediatheque/documents/radiomaritime/Manuel_Maritime_REV_Nov_15_V8.pdf)
12. Guide de radiotéléphonie pour la navigation intérieure 2014: Commission Centrale pour la Navigation du Rhin (http://www.ccr-zk.r.org/files/documents/reglementRP/rp41f_pg_022014.pdf)
13. MANUEL DE PREPARATION DU CRR FLUVIAL 2015 Agence nationale des fréquences (https://www.anfr.fr/fileadmin/mediatheque/documents/radiomaritime/Manfluvial_D%C3%A9cembre_15.pdf)

External links

- US Coast Guard basic radio information for boaters (<http://www.navcen.uscg.gov/?pageName=mtBoater>)
- Coast Guard marine channel listing (with frequencies) (<http://www.navcen.uscg.gov/?pageName=mtVhf>)
- US FCC marine channel listing (by function) (<http://wireless.fcc.gov/marine/vhfchanl.html>)
- UK MCA advice on use of VHF at sea, including collision avoidance, effective ranges, and International channel usage (https://web.archive.org/web/20070927003402/http://www.mcga.gov.uk/c4mca/mgn_324.pdf)*
- Canadian VHF Bands in the Maritime Service (<http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf01011.html#sched1>)
- VHF marine band plan in (<http://www.GemiTrafik.com/vhf.htm>)Turkey (Türkiye'deki VHF Deniz Telsiz Frekans Kanal Listesi)
- New Zealand VHF Radio Resource Center (<https://web.archive.org/web/20100818084711/http://www.vhfradio.co.nz/>)

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This page was last edited on 18 June 2022, at 22:19 (UTC).

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