

VHF Channels

5

Principle of "channels"

Syllabus item A1.3

For one radio to receive the signals transmitted by another, the receiver has to be tuned to the same frequency as the transmitter. To receive BBC Radio 4 broadcasts in the long wave, for instance, a receiver has to be tuned to 198kHz.

Higher frequencies, however, involve bigger and bigger numbers, until by the time we reach the VHF band, they are becoming unwieldy and difficult to remember. To save us having to cope with numbers such as 161.625 Mhz, the standard frequencies approved by the ITU have been given channel numbers.

Channel Designators	Transmitting frequencies (MHz)		Port operations			
	Ship stations	Coast stations	Inter-ship	Single frequency	Two frequency	Public Corresp.
60	156.025	160.625			✓	✓
01	156.050	160.650			✓	✓
61	156.075	160.675			✓	✓
02	156.100	160.700			✓	✓
62	156.125	160.725			✓	✓
03	156.150	160.750			✓	✓
63	156.175	160.775			✓	✓
04	156.200	160.800			✓	✓
64	156.225	160.825			✓	✓
05	156.250	160.850			✓	✓
65	156.275	160.875			✓	✓
06	156.300		✓			
66	156.325	160.925			✓	✓
07	156.350	160.950			✓	✓
67	156.375	156.375	✓	✓	HMCG SAR	
08	156.400		✓			
68	156.425	156.425		✓		
09	156.450	156.450	✓	✓		
69	156.475	156.475	✓	✓		
10	156.500	156.500	✓	✓	Oil Pollution	
70	156.525	156.525			Digital selective calling for distress, safety and calling	
11	156.550	156.550		✓		
71	156.575	156.575		✓		
12	156.600	156.600		✓		
72	156.625		✓			
13	156.650	156.650	✓	✓		
73	156.675	156.675	✓	✓	HMCG SAR	
14	156.700	156.700		✓		
74	156.725	156.725		✓		

Channel Designators	Transmitting frequencies (MHz)		Port operations			
	Ship stations	Coast stations	Inter-ship	Single frequency	Two frequency	Public Corresp.
15	156.750	156.750	✓	✓		Also on-board coms
75	156.775					
16	156.800	156.800			DISTRESS, SAFETY AND CALLING	
76	156.825			✓		
17	156.850	156.850	✓	✓		Also on-board coms
77	156.875		✓			
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			Also Marinas etc UK only	✓
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			HMCG SAR/MSI	✓
83	157.175	161.775		✓		✓
24	157.200	161.800			✓	✓
84	157.225	161.825		✓	HMCG SAR/MSI	✓
25	157.250	161.850			✓	✓
85	157.275	161.875		✓		✓
26	157.300	161.900			✓	✓
86	157.325	161.925		✓	HMCG SAR/MSI	✓
27	157.350	161.950			✓	✓
87	157.375			✓		
28	157.400	162.000			✓	✓
88	157.425			✓		
AIS 1	161.975	161.975				
AIS 2	162.025	162.025				

A larger version of these charts is shown on pages 82-83

Until the development of solid state electronics, VHF radios were relatively expensive, and not particularly widely used, so the part of the radio spectrum allocated to marine VHF was divided into 28 international channels, 50kHz (0.05MHz) apart and numbered from 1 to 28.

By the 1970s, however, the price of VHF had fallen and its popularity had risen, so those existing channels were becoming very crowded. Technology had also moved on, so the channel spacing of 50kHz seemed unnecessarily generous. The number of channels could be almost doubled, without using any more of the radio spectrum, by interleaving new channels between the old ones. So Channels 60 to 88 were added.

As well as having a designated frequency (or, in some cases two designated frequencies), each channel also has a specified purpose. Channel 12, for instance, is a Port Operations Channel. It would be physically possible for two boats to communicate with each other on Channel 12, but it would be disruptive, potentially dangerous, and definitely illegal to do so.

Simplex and duplex channels

Syllabus item A1.3

If two people want to talk to each other, it seems to make sense for them both to use the same frequency. There is, however, one slight snag with this idea...

When you are using one frequency, you can either receive, or transmit. You can't do both at once. Even if you had two separate radios and aerials, you still couldn't receive the other boat's transmissions at the same time as you were transmitting yourself, because your own transmissions would drown out those from the other vessel.

So using a single-frequency channel demands a degree of discipline and standard procedures to decide who is to talk and who is to listen, and how they are to switch roles when necessary to achieve two-way communication. The principle, however, is simple, so this method of operating on a single frequency is known as **simplex**, and the single-frequency channels are known as simplex channels.

Simplex operation is all very well between two operators who know what they are doing, and understand the limitations of a simplex channel. It is far less satisfactory if, for instance, you are using VHF to make a link call to your office, or to wish your mother in law a happy birthday.

If you are talking on the telephone to someone who remains totally silent, you very quickly begin to wonder whether there is something wrong with the phone! That's because normal conversation is a constant, two way process, even if one party does little more than grunt.

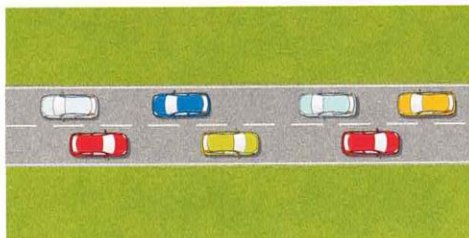
Normal, two-way conversations can be achieved by radio, by using two frequencies. One station transmits on one frequency, while the other transmits on the other. Of course, they must both have their receivers set up to receive the frequency that the other is transmitting.

This two-way, two-frequency operation is known as **duplex**, so the two-frequency channels are known as duplex channels. They are used, in the main, for public correspondence (link calls), for which two-way traffic is essential, and for some port operations channels.

You can compare the flow of radio traffic in simplex and duplex channels to the flow of traffic along a road:-



A simplex channel is like a single track road: traffic can only flow in one direction at a time, and two way traffic can only be achieved by taking it in turns

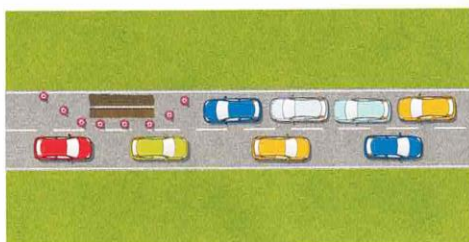


A duplex channel is like a two-lane road, in which traffic can flow freely in both directions.

Channel 80 is a typical duplex channel, intended for port operations. Coast stations transmit on 161.625MHz, and receive on 157.025MHz. This means that two coast stations can never communicate with each other on channel 80, but that is OK because there is no reason they should ever try to do so. Similarly, ship radio stations transmit on 157.025MHz and receive on 161.625MHz. Again, ship stations can't communicate with each other on channel 80, but that is OK because they are not supposed to use it as an inter-ship channel.

Channel 80, however, is of particular significance to Small Craft, because in the UK, it is one of the three channels covered by the Coast Station (Marina) licence. It is, in effect, the "Small Craft Port Operations channel". The snag is that most of the relatively economical radios sold for small craft use have only one antenna connection. You can't receive through an antenna at the same time as you are transmitting through it, even on a duplex channel.

This doesn't stop us from using duplex channels. The radio simply switches from receiving on one frequency to transmitting on the other, and vice versa. It all happens automatically when you press or release the PTT switch, whenever a duplex channel has been selected. The one snag with this so-called "semi-duplex" operation is that it sacrifices the very thing that duplex channels were set up to achieve: for most practical purposes, it is exactly like using a simplex channel.



Semi-duplex operation can be compared to a two-lane road, with road works. The fact that one lane is blocked means that two-way traffic can only be achieved by taking it in turns, just as in a simplex channel.

International and private channels

Syllabus item A1.3

If you look carefully at the table of channel numbers, frequencies and approved usage on page 25, you'll see that there is quite a wide range of frequencies (from 157.450MHz to 160.600 MHz) that seem to be missing. That is because these frequencies have been left out of the international allocation, and have been set aside as "private" channels for individual governments to allocate as they think fit.

The UK government, for instance, allocates the name “00” to 156.000MHz, and allows it to be used only by the Coastguard and recognized search and rescue organisations such as the RNLI.

Similarly, in the UK, 157.850MHz is known as Channel M and 161.425 is known as M2: they are “private” channels that have been allocated by the UK government specifically for use by marinas, yacht clubs, and pleasure craft.

Channel M and M2 should only be used in UK waters: other countries have allocated those frequencies for different purposes.

Private channels do not necessarily require an operator’s certificate. In the UK, channels M and M2 can be used by unqualified operators, without supervision.

Some radios cannot display the letter M. In such cases, Channel M is often called “37” or “P1”. Channel M2 is often called “P1” or “P4”.

American channels

Syllabus item A1.3

A few countries, most conspicuously the USA, do not conform to the international channel designation and usage. Whilst there are similarities between international and US channel designations, there are also significant differences: in particular, many channels which are duplex in the international scheme are simplex in the US version. Most modern radios can be converted from one system to another by flicking a switch or by going through a set-up menu. Make sure you aren’t using the wrong system by mistake.

If you call a UK marina using the US channel 80, the marina will hear you, but you won’t hear their reply. Channel 80 is a duplex channel under the international system, but a simplex channel in the USA.

Channel 16 and guard band

Syllabus item C3.5

Some channels are of particular significance.

Channel 16 is the outstanding example, because it is designated as the Distress, Safety, and Calling channel.

It is so important that Channel 16 should not suffer any interference that the two channels closest to it in the international frequency table — channels 75 and 76 — are regarded as a guard band. At one time, transmissions in the guard band were illegal, and any radio which allowed transmissions on those frequencies would fail its type-approval trials. The rules have now been relaxed very slightly, and these two channels are available for port operations use, but with the maximum power limited to 1 watt.

Calls on Channel 16 should be kept to a minimum, and apart from distress and safety calls, must never last longer than one minute.

Channel 70

Syllabus item C3.1

Channel 70 is the odd one out of all the international channels, because all the others are used for radiotelephony — the transmission of speech. Channel 70, however, is used for the transmission of digital data, in connection with digital selective calling (DSC).

DSC is covered in considerably more detail on pages 61 to 71. From the user's point of view, the important feature of Channel 70 is that it must never be used for voice transmissions.

Special channels

A few channels are of particular significance, and are worth memorizing.

0	A Private channel, designated in the UK for Search and Rescue organisations
6,8	Inter-ship channels
13	Used for direct bridge-to-bridge contact for matters of navigational safety
16	The Distress, Safety, and Calling channel
67	In the UK, used as a small craft safety channel
70	For DSC only — no voice transmissions allowed
72,77	Inter-ship channels
80	In the UK, the channel used by most marinas
M, M2	UK "private" channels dedicated to marinas, yacht clubs, and recreational craft.