

**Who has bought a radio on the last 5 years?**

**Who has their Radio Operators Certificate from Canada?**

**What is DSC (Digital Selective Calling)?**

DSC is an advanced, computerized form of VHF and MF radio designed for marine use. New radios with DSC capability are replacing the VHF and the MF type of radios that have been in use for more than half a century. They have all of the capabilities of the earlier radios and a number of new features that can add dramatically to the safety aspects and the usefulness of marine communications. A DSC radio's most noticeable feature is a red button labelled "DISTRESS", protected by a spring-loaded cover.

DSC automates many aspects of radio communication. Without using a microphone, a user can make a distress call just by pressing one button on the radio. DSC will then automatically supply the Coast Guard (Canadian or US) and other vessels in the area with your identification and your location. You can even dial in the reason for the distress call. DSC will automatically repeat the distress call until it is acknowledged. These digital communications result in visual messages being displayed on a receiver's display screen much like information displayed on a computer's monitor.

DSC radio can make distress calls, urgency calls, and safety messages. However, it can also be used for all-ships calls as well as routine calls (the usual person to person type calls we make using non-DSC radios) using only buttons on the radio's keyboard. They can also digitally make position requests (asking other vessels their exact location) and polling calls (who is within communication range?).

A loud alert will sound if there is a call for you or if there is a priority call such as a distress, urgency or safety message.

**The End of Channel 16..?**

Eventually, there will be no need for the Coast Guard to monitor Channel 16. In Canada, the requirement that compulsorily fitted vessels monitor Channel 16 has been dropped. Such vessels are now only required to monitor digital data on Channel 70 and MF frequency 2178.5 kHz. However, a large number of vessels are still not equipped with DSC radio, so it is desirable that Channel 16 still be monitored. The Coast Guards in both Canada and the US are still monitoring Channel 16 and will do so for the foreseeable future.

If you make a digital call of any kind using DSC, your radio transmits the message on Channel 70; thus relieving congestion on Channel 16. This digital call is sent at 'computer speed', taking only a moment of air time.

All DSC equipped marine radios can be connected to a GPS, so your radio "knows" your exact location and the exact time and sends out this information with a distress call. This can truly be a lifesaver, it takes the "search" out of search and rescue.

DSC calls can be made directly to another vessel without broadcasting; it is much more private, like making a phone call. Remember, a DSC call does not use Channel 16. If the call is directed to an individual station, then that signal is sent on Channel 70 and only that station receives the call. The call can include the channel number on which you want to hold an ordinary conversation. Channel 70 is only used for digital communication; you cannot use voice on that channel.

You can store numbers that connect you to other vessels (like storing phone numbers on a cell phone). Your radio can keep a log of calls.

Unfortunately, recent statistics shows that almost **90%** of DSC compatible radios aren't programmed. I urge you to set it up for your own safety.

**Your DSC Presence: Get a MMSI Number!**

After buying a DSC-enabled radio, you need to get an MMSI number. An MMSI (Maritime Mobile Service Identity) number is a unique nine digit number that identifies a particular ship or shore station, it's something like a telephone number. It is unique to your boat, and thus requires a registration so that numbers don't overlap. Many organizations all over the world allow you to register your MMSI number online (see list below), and it is often included in an operator's license. You will generally be asked your name, the vessel name, home port, description, secondary contact info and the like. This will be kept available in a global database in case of the need for a coordinated search and rescue.

U.S. - [boatus.com/mmsi](http://boatus.com/mmsi)  
CANADA - [http://sd.ic.gc.ca/pls/engdoc\\_anon/sd\\_pages.mmsi\\_forms](http://sd.ic.gc.ca/pls/engdoc_anon/sd_pages.mmsi_forms)

### **DSC Classes**

DSC radios are available in four categories, Class A, Class B, Class D and SC-101. They differ in their features and cost.

Class A and Class B radios are designed for commercial vessels. They are pricey and are not usually of interest to pleasurecraft owners.

Class D radios are designed for commercial boats that are not required to carry Class A or Class B equipment and for recreational boaters. They are not as expensive as Class A or B. If the price of a Class D radio is within your budget, we recommend that you use this type of DSC radio.

SC-101 is the low cost, entry level standard for DSC radios. By International law, it cannot be used on commercial vessels, but may be used on recreational boats. This class of DSC radio is very limited in capability.

One difference between lower cost radios is the methods used to enter data. Better radios tend to have a keyboard method of inputting information rather than turning dials. There is one very important difference between a SC-101 radio and a Class D. **A true Class D radio has two receivers, one of which constantly monitors Channel 70. An SC-101 radio has only one receiver. If you are tuned to a different channel or if you are transmitting, then the single receiver cannot receive on Channel 70.** Some units have a quick change feature in which they momentarily listen to Channel 70 then return to the channel you are tuned to. This is still not as good a system as having dual receivers built in, one always listening to Channel 70.

**A Class D unit will not miss any calls arriving on Channel 70 because it constantly monitors that channel.** Like anything else, you get what you pay for.



One important feature of a VHF DSC radio is that it can also send a Distress Alert which will tell the Coast Guard and other boaters in your area that you require immediate assistance\*.

\*Where VHF/DSC services are available. For more information, please contact your local Marine Communications and Traffic Services (MCTS) Centre.

As well, if your boat is equipped with a GPS receiver, it is highly recommended that it be connected to your DSC radio. This will ensure that your position is automatically sent when a distress is transmitted. Rescuers will then immediately know your exact location and assistance will arrive sooner.

**Warning: DO NOT TEST this Distress Alerting feature, there is no test feature, and in fact it is an offence under both the Canada Shipping Act and the Radio communication Act to send a false distress message.**

**Just imagine the scene:** you're out cruising with your family in your boat, when you suddenly smell smoke. You immediately stop the engine, and grab a fire extinguisher and check it out. You discover that the whole engine compartment is on fire!

The cabin is filling with deadly smoke, and you don't have enough time to get a mayday call out, but you do have time enough to hold the Distress Key on your radio down for 5 seconds, before you and your family abandon ship. A Distress Alert has been automatically transmitted on Ch70, clearly identifying you by the MMSI number, and your location, thanks to the GPS.

The call is received by the Coast Guard, who immediately send out the appropriate rescue resources\*.

\*Where VHF/DSC services are available. For more information, please contact your local Marine Communications and Traffic Services (MCTS) Centre.

All you had to do is hold the Distress Button in for 5 seconds and help was on the way! **This feature is only enabled on those radios that have been assigned a MMSI number.**

The Coast Guard urges you to complete an MMSI application form available from Industry Canada. Contact the Industry Canada District Office nearest you for more information.

## Which VHF radio channel is used to make a distress call?

If you have a VHF radio, keep it tuned to channel 16. Be aware of where you are at all times, and be prepared to describe your specific position. **Currently, all VHF marine radio operators must have a restricted operator's certificate (Maritime) – ROC(M).** Industry Canada has delegated the ROC(M) to the Canadian Power & Sail Squadrons (CPS). Contact the CPS or visit [www.cps-ecp.ca](http://www.cps-ecp.ca) for more information about courses available in your area.

## Do I need a VHF radio licence for my boat in Canada?

Industry Canada has exempted Canadian vessels that are not operated in the territorial waters of another country from the requirement for a station licence.

## Do I need a radio operator's certificate in Canada?

Marine radiotelephones fitted onboard Canadian vessels, must be operated by a person holding a Radio Operator's Certificate (ROC-M).

## VHF DSC Radio

If you are buying a new VHF radio, make sure it has the new Digital Selective Calling ([DSC](#)) feature on channel 70. This provides automatic digital distress alerts. We do have DSC here on the west coast. **Remember, VHF radio channel 16 is used for emergency and calling purposes only.** Once you contact another vessel on channel 16, switch to another working frequency. VHF channel 70 is used only for DSC (digital) communication – not voice. Use your VHF radio as described in the *VHF Radiotelephone Practices and Procedures Regulations*. Your owner's manual will explain how to make a DSC call to another vessel or to a shore station that has DSC capability.

While you may be able to get search and rescue assistance from the nearest Canadian Coast Guard Marine Communications and Traffic Services (MCTS) centre by **dialling \*16 on a cell phone, it is not the best substitute for a marine radio**. This is not the best way to issue a distress call for the following reasons:

- Cell phones can lose their signal or get wet or damaged.
- Calling from your cell phone does not alert nearby vessels that you are in distress — they could be the ones to help you if they could hear you.
- Some cell phone signals cannot be traced back to your location by rescuers.
- Not all cell phone providers offer the \*16 service. Find out if this service is available for your phone.

When in extreme danger (for example, your boat is taking on water and you are in danger of sinking or capsizing), use your VHF radio channel 16 and say “Mayday” — “Mayday” — “Mayday.” Then give the name of your boat, its position, the number of people on board, the nature of your problem and the type of help you need.

If you need help but are not in immediate danger (for example, your motor has quit and you cannot reach shore), use channel 16 and say “Pan Pan” — “Pan Pan” — “Pan Pan.” Then give the name of your boat, its position, the number of people on board, the nature of your problem and the type of help you need.

Finally, in order to avoid finding yourself in a compromising situation, keep up-to-date about the changing weather as well as the most recent navigation security alerts put out by the competent authorities, such as a cargo boat navigating in narrow waters and which could possibly put your safety at risk. The calling station will then issue a warning using the word « SÉCURITÉ », repeated three times.

The main differences between **VHF** and **UHF** come both from their frequencies and their connectivity; two-way radios that use UHF frequencies, for example, are much less likely to be interrupted during transmissions.

## Do I need a Fixed Mount or Handheld radio?

The two major types of marine radios are hand held and fixed mount radios.

[Fixed mount radios](#), as you might expect, are mounted on a boat, require power source from a boat as well as an external antenna. They are capable of transmitting up to 25 watts, which is the legal limit of a VHF radio. This set up will give you the most transmitting power.

[Handheld radios](#) are great for smaller boats and if you plan on being close to shore. There is no need for an external antenna and people love the portability of them. The power will be limited to about 5 watts and approximately 5 mile distance (depending on weather conditions and line of sight). Besides the decrease of power, most other features that you find on fixed mount marine radios can also be found on handheld radios.

A lot of boaters prefer to have a back up type of setup - having a hand held radio and a fixed mount marine radio. Remember, anything may happen and it is better to take extra precautions to be safe.

## What is the Range of VHF Radio?

As we mentioned before, fixed mount marine radios are capable of transmitting up to 25 watts of power. Handheld marine radios will have on average 3 to 6 watts of power capability.

There are many different factors that influence actual marine radio usable range, but the most significant factor is [antenna](#). VHF marine radios use radio frequency range between 156.0 and 174 Mhz. These frequencies are most effective in line of sight. Typically, standing in the cockpit of a boat, the distance to the horizon for an average adult is about three miles. The higher the antenna placement, the further distance to the horizon is, thus increasing usable range of your marine radio.

Take aways

- DSC get it
- AIS
- Program it with your mmsi number.

# Automatic Identification System (AIS): Integrating and Identifying Marine Communication Channels

By [Shilavadra Bhattacharjee](#) | In: [Marine Navigation](#) | Last Updated on May 18, 2017

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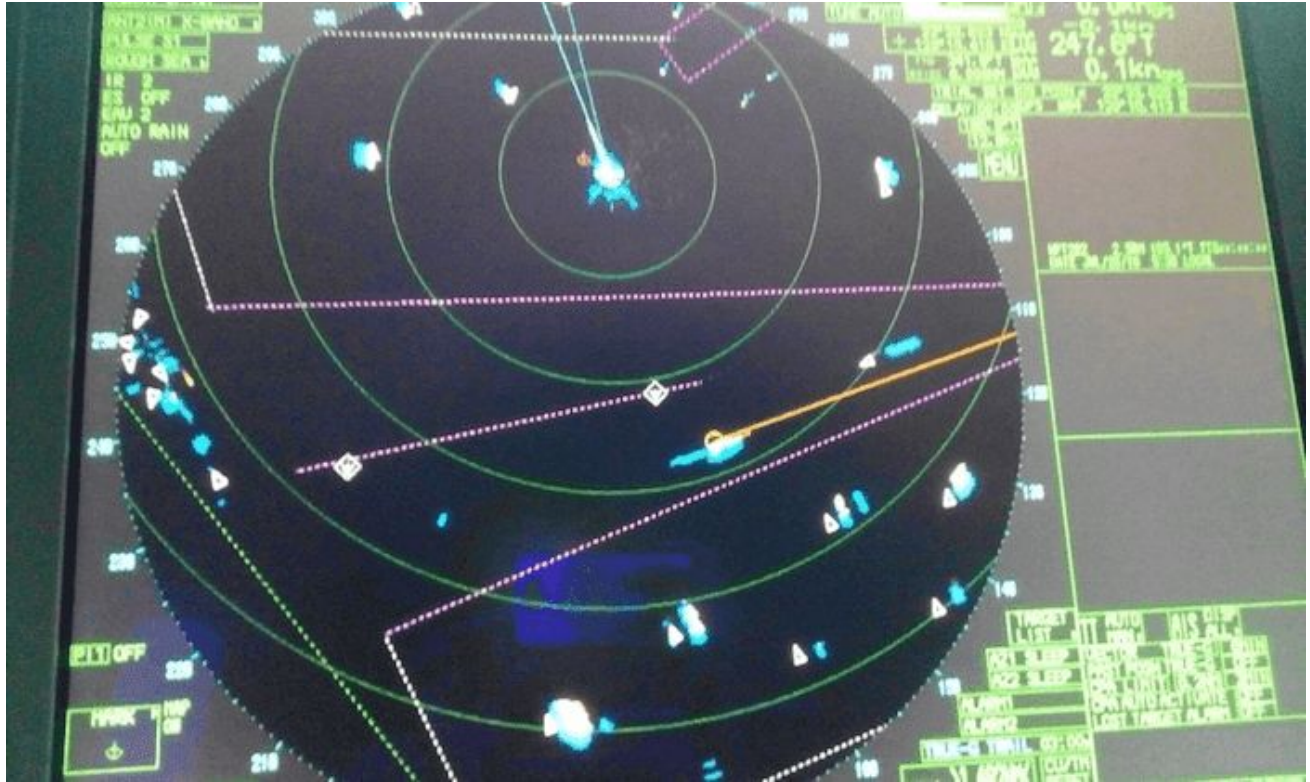
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The world of AIS (or Automatic Identification System) can often be a confusing one to delve into, with many questions arising such as “what is AIS?”, “why do I need it?”, and “what type of AIS does my ship actually need or have?”

Automatic Identification System (AIS) is an automated tracking system that displays other vessels in the vicinity. It is a broadcast transponder system which operates in the VHF mobile maritime band. Your own ship also shows on the screens of other vessels in the vicinity, provided your vessel is fitted with AIS. If AIS is not fitted or not switched on, there is no exchange of information on ships via AIS. The AIS onboard must be switched on at all times unless the Master deems that it must be turned off for security reasons or anything else. The working mode of AIS is continuous and autonomous.

## Why is AIS provided?

It is fitted on ships for identification of ships and navigational marks. However, it is only an aid to navigation and should not be used for collision avoidance. Vessel Traffic Services (VTS) ashore use AIS to identify, locate and monitor vessels. The Panama Canal uses the AIS as well to provide information about rain along the canal as well as wind in the locks.



## SOLAS Requirements

The IMO Convention for the Safety Of Life At Sea (SOLAS) Regulation V/19.2.4 requires all vessels of 300 GT and above engaged on international voyages and all passenger ships irrespective of size to carry AIS onboard.

## AIS Types

1. **Class A:** Mandated for all vessels 300 GT and above engaged on international voyages as well as all passenger ships
2. **Class B:** Provides limited functionality and intended for non SOLAS vessels. Primarily used for vessels such as pleasure crafts

AIS operates principally on two dedicated frequencies or VHF channels:

- AIS 1: Works on 161.975 MHz- Channel 87B (Simplex, for ship to ship)
- AIS 2: 162.025 MHz- Channel 88B (Duplex for ship to shore)

It uses Self Organizing Time Division Multiple Access (STDMA) technology to meet the high broadcast rate. This frequency has a limitation of line of sight which is about 40 miles or so.



## Working

How does AIS work exactly? How do we obtain all this data?

Originally, AIS was used terrestrially, meaning the signal was sent from the boat to land, and had a range of roughly 20 miles (also taking into account the curvature of the earth). As ships began sailing further and further away from land, they began sending the signal to low orbit satellites, which then relayed information back to land. This meant ships could sail as far as they like, and we'd always have peace of mind knowing exactly where they are, and how they're doing.

The AIS system consists of one VHF transmitter, two VHF TDMA receivers, one VHF DSC receiver, and a standard marine electronic communications link to shipboard display and sensor systems. Position and timing information is normally derived from an integral or external GPS receiver. Other information broadcast by the AIS is electronically obtained from shipboard equipment through standard marine data connections.

Although only one channel is necessary, each station transmits and receives over two radio channels to avoid interference and to avoid communication loss from ships. A position report from one AIS station fits into one of 2250 time slots established every 60 seconds. AIS stations continuously synchronize themselves to each other, to avoid overlap of slot transmissions.

It's pretty easy to install as well, as AIS is generally integrated with ship bridge systems or multifunctional display, but installing a standalone system is as straightforward as plugging in a couple of cables and switching on the plug.



## Data Transmitted

### 1. Static Information (Every 6 minutes and on request):

- MMSI number
- IMO number
- Name and Call Sign
- Length and Beam
- Type of ship
- Location of position fixing antenna

### 2. Dynamic Information (Depends on speed and course alteration)

- Ship's position with accuracy indication
- Position time stamp (in UTC)
- Course Over Ground (COG)

### 3. Voyage Related Information (Every 6 minutes, when data is amended, or on request)

- Ship's draught
- Type of cargo
- Destination and ETA
- Route plan (Waypoints)

#### **4. Short safety related messages**

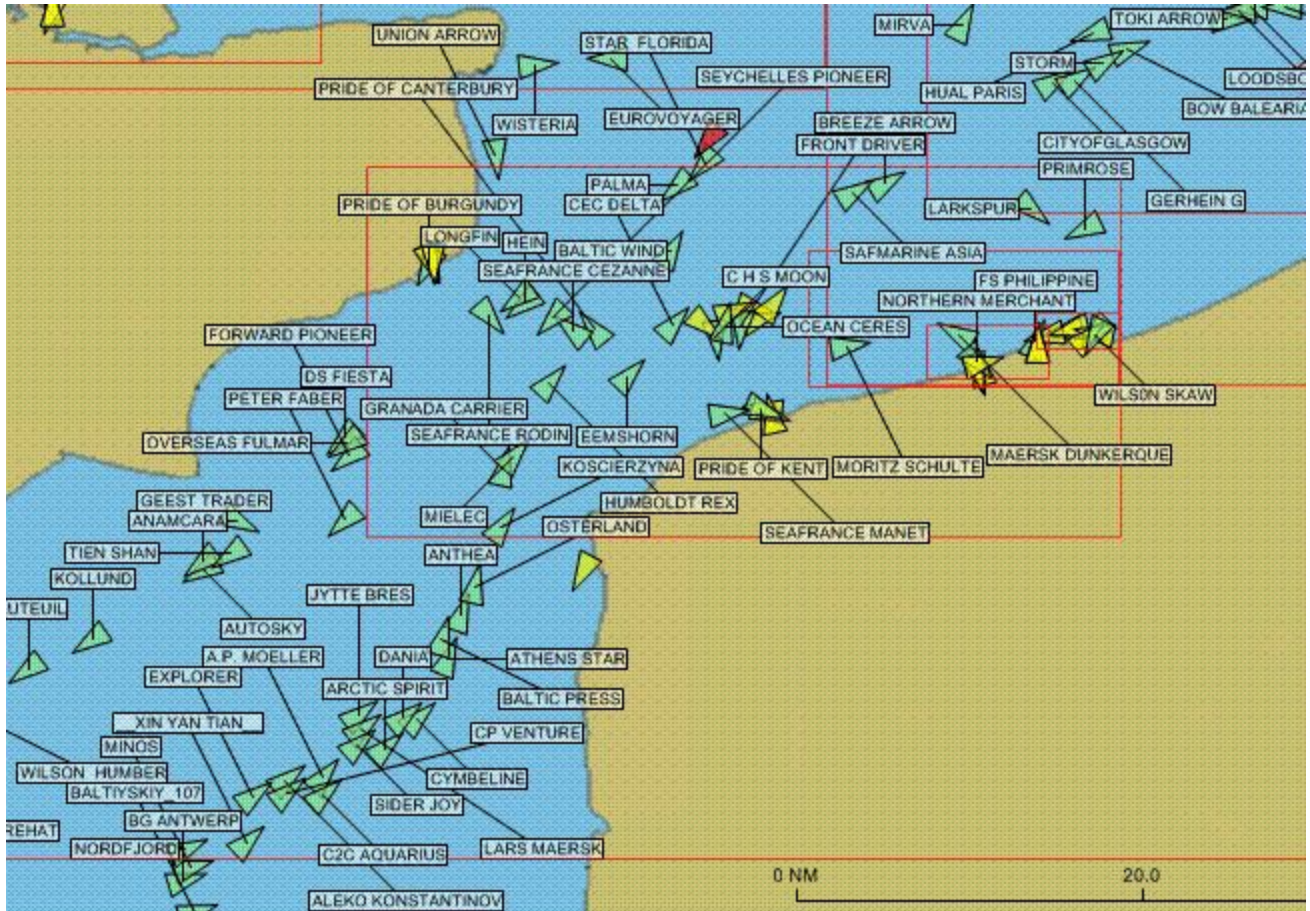
- Free format text message addressed to one or many destinations or to all stations in the area. This content could be such as buoy missing, ice berg sighting etc

### **AIS as a surveillance tool**

In coastal waters, shore side authorities may establish automated AIS stations to monitor the movement of vessels through the area. Coast stations can also use the AIS channels for shore to ship transmissions, to send information on tides, NTMs and located weather conditions. Coastal stations may use the AIS to monitor the movement of hazardous cargoes and control commercial fishing operations in their waters. AIS may also be used for SAR operations enabling SAR authorities to use AIS information to assess the availability of other vessels in the vicinity of the incident.

### **AIS as an aid to collision avoidance**

AIS contributes significantly to the safety of navigation. All the information that is transmitted and received enhances the effectiveness of navigation and can greatly improve the situational awareness and the decision making process. As an assistant to the OOW, the tracking and monitoring of targets by the AIS as well as determining information on the CPA and TCPA adds great value to the safety of navigation overall. However, the user should not solely rely on the information from the AIS for collision avoidance. AIS is only an additional source of information for the OOW and only supports in the process of navigating the vessel. AIS can never replace the human expertise on bridge!



AIS – Credits: Pline/wikipedia.org

## Limitations of AIS

As with all navigational and/or electronic equipment, the AIS has limitations:

1. The accuracy of AIS information received is only as good as the accuracy of the AIS information transmitted
2. Position received on the AIS display might not be referenced to the WGS 84 datum
3. Over reliance on the AIS can cause complacency on the part of the OOW
4. Users must be aware that erroneous information might be transmitted by the AIS from another ship
5. Not all ships are fitted with AIS
6. The OOW must be aware that AIS, if fitted, might be switched off by a certain vessel thereby negating any information that might have been received from such ship
7. It would not be prudent for the OOW to assume that the information received from other ships might not be fully accurate and of precision that might be available on own vessel

To sum it up, the AIS only improves the safety of navigation by assisting the OOW/VTIS or whatever entity. It's pretty easy to install as well, as AIS is generally integrated with ship bridge systems or multifunctional display, but installing a standalone system is as straightforward as plugging in a couple of cables and switching on the plug.

There's a lot more to AIS than meets the eye, we delve more into depth with the accompanying handbook both for beginners, and for those more well-versed in the world of AIS.