



BRUNEI BAY RADIO

(division of Intrepid Management Services S/B)
PO Box 2234, Bandar Seri Begawan BS8674,
BRUNEI DARUSSALAM
Phn: 673 2 262676 Fax: 673 2 262675
www.bruneibay.net/bbradio
E-mail: radio@bruneibay.net

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Easy Installation Strategies for Marine HF/SSB radio with DSC

Installing HF/SSB radios in yachts has become a lot simpler in recent years, with the development of new products, and a clearer understanding of how the DSC function operates.

On this larger side of the world, distant from the full-time, immediate response, centralised and 24/7 professional search and rescue facilities of Europe, the UK and parts of North America, maritime authorities continue to emphasise the importance of marine HF/SSB radio for safety and general communications. For example MRCC Australia states on their website that:

"While satellites and satellite-compatible distress beacons have significantly improved the effectiveness of SAR operations, the system is NOT a substitute for carrying appropriate marine or aviation radio.

Depending on the circumstances, your initial distress alert should still be made by radio if possible."

For further details on the unique operational features which make a modern, marine, HF/SSB radio with DSC essential equipment for recreational vessels, see the separate Brunei Bay Radio documents:

Marine HF/SSB radio with DSC - Effective Distress and General Communications for Yacht Racing Rallies and Cruising. AND

Marine HF/SSB radio with DSC - A Communications Strategy for Yacht Races, Rallies and Cruising

These two documents - and this third, present document - have developed in response to requests by race and rally operators to provide an effective communications service for events operating beyond VHF marine radio range, and beyond the range of the type of immediate response, full-time, professional, search and rescue services available in a very small proportion of the recreational boating world; in Europe, the UK and parts of North America. MRCC Australia states it clearly on their website:

"Dedicated SAR facilities are limited in Australia. When necessary, other facilities are diverted from their primary function by arrangement or request."

If SAR facilities are limited in Australia's maritime rescue responsibility area, it's not hard to imagine how limited they are in the rest of the Pacific and Indian Oceans, and SE Asia.

In this context, it's important to remember that a satphone cannot replicate numerous unique features of a modern HF/SSB radio with DSC, including;

- Free communications between yachts or yachts and shore stations
- Communications that will not be switched off in an emergency because of a lack of credit
- Convenient 24/7 monitoring of Distress and General frequencies by participating yachts, to comply with the Racing Rules of Sailing Fundamental Rule 1.1 - Helping those in Danger, the marine radio license, and YA Special Regulations for Yacht Racing - and recommended for yacht cruising.
- Broadcast communications to simultaneously alert and communicate with multiple vessels
- Distress All-Call and General Group calling to alert dozens, hundreds or thousands of vessels
- Low-cost email service - SailMail - optimised for efficient low bandwidth operation
- Free weather information - eg: METAREA & coastal forecasts, GRIB charts & SPOT forecasts.

The following sections highlight why it's now much easier to add a modern marine HF/SB radio with DSC to a yacht, and to achieve effective and reliable - Distress and General - communications for races, rallies and cruising with friends.

No need for an external earth plate:

There is now no need to install an external earth plate on wood and fibreglass yachts. The KISS-SSB counterpoise/earth does the job instead. This flexible tube of pre-cut wires is attached to the earth connection on the ATU, and laid out. Under bunks, under the floor, in the ceiling of a flybridge etc. It can even be coiled in the lazarette using a minimum 2m diameter.

Advantages of the KISS-SSB counterpoise/earth include:

1. No need to remove a yacht from the water to fit an external earth plate. So installation costs and inconvenience of fitting of a HF/SSB radio with DSC are dramatically reduced.
2. There is no need to install 2 inch copper strip from the earth connector on the ATU to the inside bolts of the external earth plate.
3. There is no need to clean the external earth plate to guarantee functionality.
4. There is no need to brief the boatyard staff not to paint the earth plate with antifouling.
5. The ATU can be mounted very close to the antenna. For example, with a yacht's backstay antenna, the ATU can be directly below the backstay, protected from the weather in the lazarette or rear cabin area, but with a very short connecting wire from the ATU to the backstay connection. In a flybridge cruiser, the ATU can be mounted in the ceiling of the flybridge, with a very short connecting wire from the ATU antenna connector to the side-mount whip antenna.
6. The very short wire from the ATU to the antenna means much more of the radio's signal is correctly radiated into the sky, to improve the effective power output of the HF/SSB radio system.
7. The very short wire from the ATU to the antenna also means very little RF bouncing around inside the boat to upset auto-pilots, fire alarms, computer ports, stereos etc.
8. It's easy and fast to install a HF/SSB radio with DSC to join an event.

What are other people saying about the KISS-SSB counterpoise/earth:

"By the way, we sell and install KISS-SSB Counterpoise Grounds and they WORK FANTASTIC. I am a HAM too. (Got my license when I was 13 years old.... I'm 57 now). I was also skeptical of the KISS-SSB at first. I first tried it out on a family camping trip in Washington State last year. I had a ICOM 746, and ICOM AH4 auto tuner. Running about 75 watts, and the KISS-SSB for ground, and a

35' wire tossed up into some tree branches for my antenna. That weekend I worked stations in Greece, Italy, Japan and east coast USA on SSB voice. THAT CONVINCED ME! :) We have sold lots of them now. All have worked very good. They REALLY simplify and lower the cost of installation of HF/SSB system, and have solved some RF feedback issues on previously installed systems using other grounding methods." Marty Kirk – Rogers Marine Electronics www.rodgersmarine.com (Portland, OR, USA)

“Dear allen, i use the Kiss ground Set .great product !!!!” Joerg Drexhagen
www.Yachtfunk.com (Germany)

“My own setup is insulated backstay and KISS counterpoise and everyone says that they hear me best. Even talked with a yacht not in our (circumnavigating rally) group here in SA who commented the same about listening to our group's skeds!” Peter Jennett (UK)

No need for a second whip antenna for the Distress receiver:

Modern marine HF/SSB radios with DSC (eg: ICOM M801E and ICOM M802DSC) have two separate receivers. The **General receiver** uses the yacht's regular antenna (eg: whip, backstay etc) to listen for DSC calls and for voice or email communications.

A completely separate **Distress receiver** in these radios continues to monitor for DSC Distress Alarms broadcast by a vessel in distress, even when the General receiver/transmitter is busy; either voice or email communications. This separate Distress/Alarm receiver uses a separate dedicated antenna. In the past many people were advised to fit another expensive HF whip antenna; and find a place to locate it. This is not necessary:

“As far as the DSC antenna or the DSC Emergency Reception Antenna (DERA) as I renamed it in my book, almost anything will work. I have told people to take a piece of RG58 with a PL 259 on one end, strip off 5-6 feet of the outer cover and the shield, put some shrink tubing on it to make it look nice and then hang it vertically someplace, even in a closet on a boat. Even in the closet you will pick up DSC calls that are close enough for them to make a difference. I think a CB antenna would also work fine as the DSC antenna that is sold is not really tuned for anything.” (see Terry Sparks - www.made-simplefor-cruisers.com)

A HAM friend of mine in Sydney - a recently retired HF/SSB radio installer for marine and aircraft use - has also confirmed that it is possible to use an existing AM/FM stereo antenna. Just install a splitter box in the Co-ax from that antenna. Take one branch to the stereo for FM/AM radio reception, and take the other branch to the Marine HF/SSB radio to provide the input for the separate Distress receiver.

Using either of these options will significantly reduce the cost, complexity and time required to install a modern marine HF/SSB radio with DSC.

Setup the DSC equipped marine HF/SSB radio for more versatile yacht-to-yacht DSC calling:

The standard DSC calling system programmed into most modern marine HF/SSB radios with DSC is oriented principally to duplex channels, on the assumption that most calling will be from the yacht to a shore station. This is fine in places with numerous coast stations, but that does not occur in most of the world. Once yachts are away from the well established coast stations and search and rescue

services in Europe, the UK and parts of North America, it becomes far more important for yachts to reliably contact other yachts in their cruise, rally or race group. Other yachts, are likely to be the primary source of problem solving advice and nearby assistance in the case of crew illness, equipment failure, low fuel, need food or drinking water, or a tow etc.

This amended frequency programming converts the default duplex DSC calling channels (to call only coast stations) to simplex DSC calling channels/frequencies for General calling, which makes previously impossible yacht-to-yacht DSC calling on the 4, 6, 8 12 and 16 Meg DSC calling frequencies now possible. And still permits General DSC calling to coast stations.

This frequency adaptation for the General receiver is recommended by both Cmdr (US Navy Ret) Terry Sparks (see www.made-simplefor-cruisers.com) and Bob Smith (Yachtcom, UK see www.yachtcom.co.uk) in their revised frequency scanning plan for the DSC General receiver in ICOM radios. This adaptation converts all the General DSC watch frequencies to simplex to facilitate yacht-to-yacht AND yacht-to-shore station-to-yacht use, rather than solely yacht-to-shore station use. See:

<http://www.made-simplefor-cruisers.com/-%20ICM802/Appendix%20XI%20DSC%20calling%20upgrade%20for%20Cruisers.pdf>

AND

<http://www.made-simplefor-cruisers.com/-%20ICM802/ICOM%20DSC-EMERG%20Frequencies.pdf>

This re-programming of the DSC General watch frequencies in ICOM M801(E) and M802(DSC) radios has been in successful operation for years in the UK/Europe and in the USA, based on the (co-incidentally identical) strategy of both Terry Sparks (see www.made-simplefor-cruisers.com) and Bob Smith (see www.yachtcom.co.uk).

Making this adaptation to the standard General DSC watch frequencies enables longer range yacht-to-yacht DSC and MMSI calling. Yachts in a race, rally or cruising fleet can maintain a *constant scanning watch* for General DSC calls from other participants, utilising the quiet/muted functionality of the DSC radio's speaker. Yachts helping other yachts to deal with problems before they become a Distress issue, is much easier and convenient with this configuration.

This amendment - to make DSC General calling between vessels possible - is now the subject of an official ITU (International Telecommunications Union) review to improve/permit vessel-to-vessel DSC calling on the official HF/SSB DSC calling frequencies. See the document sent to me for official comment: <http://www.bruneibay.net/bbradio/Documents/Appendix%20XI%20DSC%20calling%20upgrade%20for%20Cruisers.pdf> . This change is now also under review for SOLAS vessels (ships over 300 tonnes). If this is confirmed, small-craft will be able to again contact big ships using General DSC calling; without sending a Distress DSC call.

Setup the DSC equipped marine HF/SSB radio for group calling when participating with other - similarly equipped - yachts in a race, rally or cruise:

The amendments made in the re-programming described above also make it feasible to establish an effective group calling system amongst yachts travelling together in a cruise, race or rally.

Any yacht can then initiate a DSC Group Call (through the radio's General transmitter/receiver, not the Distress/Urgency transmitter/receiver) which will un-mute the speakers in all other group member's radios monitoring for that Group MMSI ID, and set the radio into an alert state. This

permits any yacht to quickly and simply contact all other participants for advice, assistance and mutual support. It can also be used to DSC call the group to initiate voice skeds.

Here is the information from Terry Sparks: "With all the boats maintaining a DSC watch, this would allow the group members to immediately contact all others in a less than distress mode. I use this in Mexico with friends, but it also seems perfect for racers and rallies.

If you have not set up a group before, everyone just needs to create a group with the same MMSI number. The number must be unique and the easiest way to establish one is to take a real MMSI number, put a zero in front and move the other numbers right one place.
e.g. My MMSI is 366820740. The group I use in Mexico is 036682074."

Add a Pactor controller to get low-cost email via the SailMail service:

The Pactor controller is positioned between the on-board PC/notebook (eg: which runs the on-board navigation software) and the modern marine HF/SSB radio with DSC. In combination with the software used to create, send/receive, read and store emails, and an address book, the Pactor controller can also control the radio's frequency to establish a connection with one of the linked network of over 20 SailMail stations around the world, to send and receive emails.

The Pactor controller and AirMail software, is easy to install in conjunction with a modern HF/SSB radio with DSC. The AirMail software and the SailMail message management system is developed, maintained and managed by smart computer people who are also very active sailors (eg: an award winning navigator who also works with Americas Cup teams on sail and boat telemetry). They wanted an email system that worked efficiently, with the minimum of maintenance and attention; so they could go sailing! And is therefore also low-cost to operate.

SailMail membership includes a number of valuable services for no additional charge:

- Ability to request and receive official METAREA forecasts; the same forecasts for which big ships pay a small fortune via their INMARSAT service.
- Ability to request and receive coastal weather forecasts for many parts of the world.
- Ability to request and receive GRIB weather charts and SPOT forecasts for up to ten days in advance. Great for passage planning, picking a calm anchorage or identifying the surf break that will be running.
- Monitor a shore email address for emails to download to the boat. Use this to prevent unnecessary emails being transferred to the boat.
- Receive weather warnings, waypoints from other cruisers, and emails from family, friends, parts supplier, or your business office.
- Free position reporting for friends and relatives to see on-line.

A modern marine HF/SSB radio with DSC will save money on voice and email communications:

The investment in a modern marine HF/SSB radio with DSC will pay off handsomely by using it for no-cost yacht-to-yacht voice communications, and for email communication to people beyond the cruise, race or rally fleet. In comparison, satellite based communications - for voice and email - is very expensive. |

Unlike satellite based email systems, SailMail was not created to make a profitable business; it is a not-for-profit foundation. SailMail was initially created by some sailors so they could go sailing, but stay in touch with their profitable shore business; for the least cost.

SailMail and its Pactor controller are very efficient and economical in terms of station equipment time, message management resources, and bandwidth. Unlike satphone based email systems, SailMail aims to minimise subscribers connection time, so more users can efficiently share the same equipment, and the annual membership fee per subscriber can continue to remain low. Satellite based data services operate in reverse; they want to maximise subscribers' connection time, to justify higher monthly bills and their profits. SailMail costs just US\$250 per annum for a fixed subscription, with no monthly connection time bills. A satellite based data/email service shifting a similar amount of traffic can easily cost that amount each month.

The SailMail service needs to be efficient because it cannot increase the amount which subscribers pay each month. But the satellite data service is the opposite, with charges based on connection time, thereby rewarding operators with more money for lower efficiency. Inefficient operations, lost connections, slow transfers and repeat transmissions of the same data all lead to significantly higher monthly subscriber bills and bigger profits for satellite service operators. SailMail does not have the same high-tech cost structure, with expensive space rockets, rocket scientists and satellites to fund.

The AirMail software written for SailMail, can also be used to send and receive emails via a satphone, such as Iridium or Thuraya. This can be useful as a backup in case of loss of on-board power or damage to the HF/SSB radio or antenna. BUT, despite the efficient message compression and message handling protocols built into AirMail for low bandwidth carriers - which will lower satellite connection time compared to the standard software - the cost of sending and receiving emails via satphone is very significantly higher than via the HF/SSB radio. This is highlighted numerous time on the SailMail website. It is also confirmed in this statement (September 2012) from Bob Smith in the UK, (www.yachtcom.co.uk), a long-time seller and installer of HF/SSB radios, and satphones:

“Have had some very similar comments from my customers that the SSB route can be faster and a lot cheaper then using Iridium. Most people that go down the satellite route do not appreciate the running costs until they receive their first bill!”

Safety - another significant advantage of on-board HF/SSB radio email:

See this article (http://www.scs-ptc.com/news/pactor-rescue-bounty-crew/pactor-rescue-bounty-crew/newsitem_view_frontpage) - regarding the October 2012 loss of SV Bounty. HAM radio calls and satellite phone calls could not get a response (presumably, no marine HF/SSB radio with DSC on-board) but an email via HF/SSB radio did.

Most MRCCs monitor for emails (<http://www.bruneibay.net/bbradio/bbremergcontactlist.htm>) 24/7. They no longer listen for HF/SSB radio voice calls - MAYDAY or PAN-PAN - but only for DSC alarms. Without a modern HF/SSB radio with DSC, email via an older HF/SSB radio has proven successful to alert an MRCC and ask them to unmute their speakers and talk on the distress voice frequency. So despite not being part of the official maritime communications service, email can get the desired result, if DSC is not available.

It's certainly financially beneficial to have HF/SSB radio based email on-board - rather than solely satellite based email - and, like a modern marine HF/SSB radio with DSC, it's easy to setup.

Allan J Riches

Brunei Bay Radio