

By Gordon West – Latitude 38

Despite several advances in offshore voice communications such as satphones, marine single sideband (SSB) isn't going away anytime soon. That's because SSB radio, unlike satphones, allows an unlimited number of people to listen in to a transmission at the same time.

As such, SSB radio is the only way to go for the various regional cruising nets, such as the Baja, Sonrisa, Chubasco and Southbound nets. It means, for example, that when Don Anderson of *Summer Passage* transmits his latest weather forecast, an unlimited number of people can listen in at once. And when someone has a question about the forecast, everyone can hear the question and Don's response.

Marine SSB is also perfect for cruising events such as the Baja Ha-Ha, the Caribbean 1500 and the Atlantic Rally for Cruisers. "While the Ha-Ha doesn't require SSB radio," advises the Grand Poobah of that event, "most boats do have them. They are good for safety - but fun, too. The folks with SSB radios are able to actively participate in all the roll calls, weather and fishing reports, and other fleet news. Over a period of nearly two weeks, personalities develop over the radio, and an even greater sense of community is established."

In racing events such as the Pacific Cup, the TransPac, and next year's revived Tahiti Race - where SSB is required of all entries - it offers more than just straight communication. "Thanks to marine SSB, our 1700 hour reports and discussions maintain the racing camaraderie and fun," comments Jack McGuire, KG6CJN, Communications Chairman of next year's Pacific Cup race from San Francisco to Hawaii.

Although not the subject of this article, the other significant benefit of SSB radios is that they, when used with a Pactor modem and SailMail, allow for the transmission and reception of short emails while offshore.

Licensing

You don't need to pass a Ham radio operator's test to operate marine SSB. All that's required is a valid Ship Station license and a lifetime Restricted Radiotelephone Operator's permit. No testing required! The Ship Station license is good for 10 years and is non-transferable. If you're good at dealing with government online forms, you can apply for a license yourself at wireless.fcc.gov. If you're not so good at it, or don't want to take the time, my lovely wife Suzie will be happy to help for a fee: (714) 549-5000.

How is Ham (amateur radio) different than SSB radio? If you're new to long distance marine radio, I suggest not even worrying about it. Although I run the Radio School and some of the income comes from teaching students how to use Ham radio and pass the test, I generally discourage new SSB operators from taking that step right away. Get the no-test license for SSB radio, become familiar with the procedures and protocols, and use it for a few months. If you find that you're one of the very few cruisers who talks on the radio so much that SSB frequencies aren't adequate, then look into Ham radio. Or, if you're going to the South Pacific, where there is

lots more traffic on ship-to-ship channels, you might consider eventually moving up to Ham status. But generally speaking, it's really only for serious radio buffs.

By the way, there is nothing to prevent folks with SSB radios from listening on Ham frequencies, and indeed, there are some helpful weather broadcasts on Ham-only frequencies. If you're new to SSB radio and worried that you might accidentally stumble onto a Ham-only frequency, start transmitting, and really piss off the 'radio police', fear not. SSB radios that are capable of working Ham frequencies come 'locked' from the factory. Some can only be unlocked using software, while others can be unlocked by just pressing three keys at the same time. In cases of genuine emergencies, Ham frequencies can be used even by people who don't have a license.

How Far on What Bands?

A marine SSB system operates on a marine radio spectrum called 'shortwave', medium frequency and high frequency: 2 MHz-26 MHz. This radio spectrum is shared with hundreds of other radio users such as shortwave broadcasts, Ham radio, FEMA, the American Red Cross and long-range aircraft.

Radio signals within the SSB shortwave spectrum refract off the ionosphere and come back to earth hundreds to thousands of miles away without the need for communication satellites and/or ground stations. Each marine SSB radio frequency band has a very predictable skywave bounce 'bulls-eye'. If you choose a band that's too high, your signal will skip over the other station. If you choose a frequency that's too low, your signal won't go far enough to reach the other station.

The following is a good guide for choosing the band of frequencies that will target your first skywave bounce:

2 MHz 200-400 miles
4 MHz 400-600 miles
6 MHz 600-1200 miles
8 MHz 800-1600 miles
12 MHz 1200-2400 miles
16 MHz 1600-3200 miles
22 MHz 2200-4000 miles plus
26 MHz unpredictable during
our solar cycle minimum

Pop Quiz #1: You are in San Francisco and you want to talk with your buddy who is on his boat 1,200 miles away in Cabo San Lucas. Which band on marine SSB might you choose?

Answer: Because 4, 6, and 8 MHz would likely fall short on the first radio signal bounce, 12 MHz and 16 MHz would likely be your best choices

The thing that usually drives new SSB operators nuts - and I know that it still irritates the Grand Poobah of the Ha-Ha - is that SSB radio frequency/channels are so different from VHF, FM,

television and almost every other kind of channel. On VHF, for example, channel 72 is channel 72. On television, channel 7 is channel 7. What could be more simple?

Certainly not SSB radio. Get this: while 4146 is always 4146 on SSB, it's also known as 4A, and sometimes the designator 4-1. In addition, depending on the individual radio, it's often channel 35 or channel 77, but could also be some other channel. That's right, depending on what radio you bought and when, and who might have customized the user channels, channel 35 and channel 77 may or may not be 4146 and vice versa. And, of course, it might also be channel 63 or 147 - or a bunch of other channels.

The most sure way to get to 4146 is to just tune to 4146. The problem is that you may have to do a lot of knob turning, which gets to be annoying. In order to eliminate unnecessary wrist injuries from knob turning, some manufacturers 'channelized' the more popular frequencies. That is, they assigned specific channels to specific frequencies. For example, the Icom SSB radios of several years ago assigned channel 35 to frequency 4146 (aka 4A and 4-1). That was all well and good. Unfortunately, in later radios they decided to assign channel 77 to 4146 (aka 4A and 4-1). In addition, some retailers created custom 'user channel' packages, which gave yet another channel designation to 4146.

How did it all come to this? SSB operators used to have to spin the frequency knob like crazy to find anyone because there are more than 1,000 SSB frequencies - only a very few of which will ultimately be of interest to you. (More on that later.) As a result, most modern marine SSB transceivers - a fancy name for a combined transmitter and receiver in one black box - have nearly 700 pre-stored duplex channels - a channel simply being a specific frequency designated as a channel for easier access. After all, what's easier, dialing through 1,000+ frequencies or 700 channels?

Nonetheless, you could spin your SSB channel dial all day long and you'd probably still hear nothing - except for WLO, the excellent radiotelephone station located in Mobile, Alabama. If you want to pick up something, look for on-the-hour weather and traffic reports on the following International Telecommunications Union (ITU) three- and four-digit designators: 405, 417, 805, 824, 830, 1209, 1212, 1226, 1607, 1624, 1641, 1807, 2237 and 2503. If you punch in 1607 on the hour, you'll get traffic lists and weather broadcasts from powerful WLO. The U.S. Coast Guard also broadcasts voice weather reports on ITU channels 424, 601, 816, 1205, and 1625.

Because SSB radios are more complicated than VHF radios, you might initially have a little trouble punching in all the three- and four-digit ITU channels and/or the actual frequencies. Maybe I can help.

ICOM America, Furuno, and SEA are the last remaining SSB manufacturers, and of the three, ICOM is the undisputed leader when it comes to equipping recreational vessels with marine SSB gear. To assist North American sailors in more easily calling up relevant ship-to-ship, Coast Guard, weather facsimile, Ham and marine telephone stations, they have pre-programmed 160 'favorite channels' - channels 1 through 160 - into a memory circuit titled 'User Channels'. These channels begin with the informal designator #1, and end with #100 - unless, of course, you have the new ICOM 802, which has user channels #1 to #160.

For example, if you have an Icom 802 and tune to Channel 77, you'll find that you'll be on frequency 4146 (aka 4A). And if you tune to Channel 118 on an 802, you'll find yourself on frequency 3968, which is home to the Sonrisa Net at 7:30 a.m. Pacific Time in the winter. It will even show 'Sonrisa Net' on your screen, even though the Sonrisa Net only uses that frequency a few hours each day.

Your radio will no doubt also have a toggle for 'channel/frequency'. As you toggle it, the display will switch back and forth from, say frequency 4146 to Channel 77 - assuming, of course, that 77 has been assigned to 4146 on your particular radio.

Take this opportunity to run all the user channels on your radio, and make a list of what frequencies/stations they refer to. As mentioned, if you have a newer Icom 802, it's very likely, but not certain, that you have the same channel/frequency combinations as owners of other new Icom 802s. But if you have an older Icom model, or perhaps had a custom user channel package put into your 802, I'd recommend you have an authorized Icom dealer come down and give you the most recent user channel package. All he does is plug his computer into the front of your radio and download the new stuff. It shouldn't take more than 15 minutes, and will synch you with the majority of other SSB radios.

Latitude 38's
Favorite SSB Channels

When cruising Mexico, these are the only channels you'll really need for calling ship-to-ship or ship-to-California.

Channel Designator	Latest ICOM Downloadable Channel	Frequency kHz
4A	77	4146 kHz USB
4B	78	4149 kHz USB
8A	97	8294 kHz USB
8B	98	8297 kHz USB

If you look at the table above, you'll see Latitude 38's favorite SSB channels that I've compiled to help you better understand that each channel has a specific purpose. You'll notice there aren't 700 of them. That's because you can only use 33 primary channels. And for cruisers in California and Mexico, you'll almost exclusively be using just five of them: 4A, 4B, 4C, 8A and 8B. That's not many, but you'll rarely have trouble finding an open channel. (There are an additional 49 secondary channel/frequencies on the 4 MHz and 8 MHz bands that you can use if they aren't being used at the time, but if you're just starting out, you don't need that additional confusion.)

The main thing to do is play with your user channel/frequency combinations so you become familiar with them. It won't take long. If you find that your channels are out of sync with most

other folks' SSB radios, you might want to change yours to match theirs. Depending on how technical you are, you may or may not need assistance.

Calling for Help over the SSB

In addition, there are six Coast Guard Global Maritime Distress and Safety System (GMDSS) channel/frequencies:

2182, the distress channel

4125 (4S)

6215 (6S)

8291 (8S)

12,290 (12S)

16,420 (16S)

The Coast Guard or other international rescue agencies monitor them 24 hours a day. U.S. Coast Guard monitors out of Hawaii, Guam, Alaska, San Francisco, New Orleans, Miami and Norfolk.

Warning! Remember, different bands have different ranges. If you make an emergency call on 2182 when you're halfway between Mexico and the Marquesas, it's very unlikely anybody is going to hear you. If you check the earlier chart, you'll see that you'd actually want to transmit on 12,290 (12S) where the range would be 1,200 to 2,400 miles.

Checking Your SSB Reception and Transmission

Okay, you're getting some meaningful reception as you dial around the channels, but you'll probably still be wondering if your SSB is working as it should. One way to begin to find out is by trying to pick up the time signals at 10 and 15 MHz and WWV, which provide a continuous signal for a ready reference. If you're still at the dock and plugged in, you may find that turning off the shorepower battery charger will make a huge difference in your reception. Ditto for the refrigeration and any florescent lights or inverters that might be turned on.

If you're unsure if you're transmitting, you can tell a lot by looking at the LCD display on the face of your radio. First, push the 'TUNE' button, at which point the radio should briefly transmit a low power signal to tune the automatic antenna coupler. Do this on any 6 MHz channel as long as there is no traffic on it. The word 'TUNE' should flash a couple of times on the LCD screen, and then stay up on the screen when the radio cycles back to receive. Still see the word 'TUNE'? This is good. However, if the word 'THRU' comes up, or 'HI SWR', you've got problems. At that point it's probably time to bring in a NMEA-qualified marine SSB specialist to see what's wrong between your radio and your tuner.

Assuming you do get 'TUNE', it's time to pick up the mic and try a short transmission. After doublechecking that the frequency is clear, key the mic, and speak directly into it saying "FOOOUUUR." The mic should be touching your lips when you do this. If the following things happen, it suggests that your transmission is good and powerful:

- 1) The LCD bar graph goes full scale.
- 2) Your cabin lights dim slightly.
- 3) The instrument indicator lamps glow.
- 4) The bilge alarm squeaks.
- 5) The house battery drops about a half volt.

It is perfectly normal for instrument panel lights to glow and bilge alarms to squeak when a powerful 100 watts are coming out of your marine SSB. But most important, doublecheck that the LCD transmit indicator shoots across the screen when you say a very loud "FFOOOUUUUR".

A potentially more dangerous way to test the transmit power output is with a small florescent tube at night. Ask your first mate to hold the glass tube against the insulated backstay antenna or the big white whip. Caution! Be sure they don't touch the backstay with their fingers or other parts of their body, as this could result in a nasty burn or worse. Say the magic word, "FFOOOUUUUR" once again, and the tube should instantly light up. The glass must actually be touching the radiating antenna or antenna lead-in single wire for this to happen.

If, when you say the magic word "FFOOOUUUUR," the cabin lights dim, the bow head flushes, numerous bilge alarms go off, and the florescent tube lights up, chances are excellent that you're putting out 100 watts. But are they clear watts? Only a radio test with another SSB user can determine that, so ask someone else in the marina to dial in a common ship-to-ship channel, such as 6224, and run your radio check. This will be a good test for a nice, clean signal.

If your test partner reports that your sound was garbled and you've just added a new email modem to your rig, temporarily disconnect the wire going from the back of your marine SSB to the computer. If your voice now sounds clear, these additional wires are the problem. Snap-on filter chokes are available from your local marine electronics specialist that may resolve the garbled voice problem.

A good test for the range of your radio is with me! I'm happy to offer *Latitude* readers free, on-the-air radio checks on an appropriate SSB frequency that will agree with the approximate range between your station and mine, here in the Newport Beach area. If your boat is in the Bay Area, we will likely use 8 MHz. If you are local, we'll go with 4 MHz, and if you're down at Cabo, we'll probably choose 12 MHz. Call me on the phone at (714) 549-5000 weekdays and we'll find a nice quiet channel for our radio check.

Another great way to test your marine SSB transmit-and-receive capability is with weather guru Don Anderson on his marine SSB Amigo Net. He begins at daybreak, at 1415 hours Zulu (UTC) on 8.122.0 MHz, upper sideband. If you have the latest frequency load from Icom America, it's already stored in memory as channel 105. If you don't find it in memory, you will need to break out the instruction book and learn how to program a new frequency to be stored in your user programmable frequency 'bin'. It's not hard, but if you've never done frequency programming before, it can be a mystery. You might want to call in a marine electronics tech familiar with marine SSB equipment. Try Don Melcher of HF Radio On Board (Alameda) at (510) 814-8888;

Shea Weston of Offshore Outfitters (San Diego) at (619) 225-5690; Steve Helms of Marine Radio Consultants (San Diego) at (619) 276-5530; Or me. I'll try to talk you through the process.

I've got two final tips.

First, if you sent your Icom 802 to the factory to get the 'clipping' problem fixed, you'll note that there are two places to plug in the antenna. One is for the DSC antenna, the other for your SSB antenna. Unfortunately, they are not clearly labeled. A number of people have gotten their radios back and plugged their SSB antenna into the wrong port. As a result, transmit and receive range are minimal. You would see an antenna tuner error if plugged into the wrong jack. Set it up temporarily and test it with time signals.

Second, Icom is very conservative in an attempt to make sure none of their radios violate FCC rules on output power and how wide the signals are. I think they are too conversative. If you get that voice compression software unlocked, your radio transmissions will boom out with a commanding signal like Voice of America. The software upload is only available from authorized Icom dealers. They can come aboard and plug it into your radio, as well as the most recent 'user channel' update. It usually takes just 15 minutes.

- *gordon west*

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