Squeezing Performance from Your SSB: Tips for Long-Distance Radios

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If you fish offshore or travel far from home port, you may have plunked down two or three grand for a single-sideband radio and had it installed, then went about your business with only a minimal understanding of how to use it.

While fishermen usually buy SSB-HF radios only for emergencies or to communicate with other fishermen or the company when outside the limited range (20 to 50 miles) of VHF, the "big set" has a lot of other capabilities. There is the worldwide high-seas telephone service, and with some modestly priced optional hardware and software, the set will serve as a weather fax, a radio telex, and a mobile e-mail site. Some popular sets also have amateur (ham) radio frequencies.

Single-sideband (SSB) broadcasts a special kind of amplitude modulation (AM) radio signal, which operates in the high-frequency (HF) range between 1.7 and 30 MHz. Like other AM signals, it consists of a ground wave, which follows the surface of the ground, and a sky wave, which bounces off the ionosphere and back to earth. Normally, ground wave signals are good for only about 50 miles, and the lower-frequency HF bands like 2 mHz are effective mainly due to a strong ground wave rather than sky wave bounce.

A good sky wave signal, on the correct band with good conditions in the ionosphere, can carry thousands of miles and, since it is omnidirectional, can essentially reach anywhere on earth.

How can a set the size of a bread box, operating on 150 watts from a 12-volt battery, punch out such a big signal, when AM broadcast stations need tens of thousands of watts just to cover a single metropolitan area? SSB dispenses with the power-intensive carrier and lower sideband signals of standard AM, so it is a lot more energy-efficient; but it requires more operator effort.

To get performance from your radio, it first must be installed correctly. That means a suitable automatic tuner or coupler, a high-quality marine whip antenna at least 20 feet long (some experts say at least 28 feet), and adequate ground plane or "counterpoise." The radio energy wave needs a large electrical field springboard from which to launch, and that calls for lots of metal in the boat, connected to the surrounding seawater. If you have a steel or aluminum hull it's easy; otherwise you need to lay plenty of copper mesh or strapping (110 square feet is standard) in a block or radiating pattern inside the hull below the waterline, bonded to metal components such as engines, metal fuel tanks, copper water and hydraulic lines, and underwater metal through hulls. Some owner's manuals are a little vague on counterpoise, so consult an SSB book for details.

After setting up your sideband, you have to spend some time learning to use it. Solar radiation ionizes air molecules, causing radio waves to skip. The level and density of this ionized layer changes hour by hour throughout the day and night, and it also changes from summer to winter. The best frequencies for each transmission distance change as well. Frequency propagation tables indicate maximum and minimum signal coverage, but they are only estimates.

In general, the longest ranges during the day are obtained with higher frequencies (16 and 22 mHz) and lower frequencies (4, 8, and 12 mHz) reach farthest at night. The best indication of suitable frequencies comes from listening to a lot of different bands, and logging stations received by date and time. After a while, a pattern of successful reception will emerge from your logbook entries, which will suggest the best frequencies to try when you need to communicate.

One problem with SSB is that the worldwide calling and distress frequency is 2,182 kHz, but range is relatively short during the day, often no more than 100 miles. In Alaska, 4,125 kHz is an unofficial calling channel, and is monitored by the Coast Guard; but unfortunately, some users—including a couple of major fishing companies—use it like a private channel and tie it up for half an hour at a time with tender reports on summer evenings. As most Gulf of Alaska/Bering Sea skippers know 4,125 is where you can hear Peggy Dyson with weather and announcements at 8:00 a.m. and 6:00 p.m. daily.

To keep in touch with your pals by sideband, you have to set up a schedule. If you want a radio check, try the AT&T high-seas operators: KMI in California, WOM in Florida, or WOO in New Jersey. Each monitors dozens of duplex channels (your set transmits on one frequency and receives on another, so that other vessels hear only half of the conversation), and you can get a list from the company. Remember that you may have to transmit continuously for up to 45 seconds for their equipment to tune in your signal, and if you are unsuccessful on one channel you have to try others.

Unless you hold at least a second-class commercial radio license, do not attempt to make any adjustments or repairs to your set; it is both dangerous and illegal. Keep it clean and dry, and each season check the power and antenna connectors and all the connections in the ground plane system for moisture and corrosion. Copper strapping corrodes quickly in a boat, but a few minutes with steel wool and cleaning solvent will return the counterpoise to full effectiveness.

For additional information, here are three useful books:

- *Mariner's Guide to Single-Sideband,* by Fredrick Graves, SEA, Inc.
- *Marine Single-Sideband,* by J. Michael Gale.
- *Marine Single-Sideband Simplified,* by Gordon West, Icom America. ✦