

## Making the Grade

**P**ractical Sailor testers ran all the radios through a series of bench tests—including transmitter power output, frequency accuracy and stability, and receiver sensitivity—using our Ramsey COM3010 monitor.

Regulations set by the US Federal Communications Commission (FCC) restrict the maximum power output of a marine VHF transmitter to 25 watts and specify the need for a low-power setting, typically 1 watt, for harbor use. Testers took transmitter power measurements directly off the radio antenna port. In any real-world scenario, many factors—antenna size and design, connecting cable length and type, faulty connections, or corrosion—could limit the actual radio frequency (RF) power emitted from the antenna.

Transmitter power stability was rated over a range of tests that included varying the input voltage and radio temperature. The less variation in power output, the higher the radio was rated. To reach temperature extremes, each radio was put in a bait freezer (at 15 degrees F) for four hours and also left to cook for two hours on a truck's dashboard on a hot, sunny South Florida day. (Testers measured the truck interior to be 122 degrees.)

Frequency accuracy is defined as the ability of the transmitter to send out signals on a selected frequency. Frequency stability measures the transmitters' ability to maintain frequency accuracy over its entire temperature operating range. The closer to the selected frequency a transmitter stayed, the higher testers rated it. The FCC mandates an accuracy of 10 parts per million (about 1550 Hz off frequency). Industry groups typically call for half that error.

Power draw was recorded using a Fluke 336 clamp-on ammeter while transmitting at 13.8 and 11 volts DC. We also measured each unit's low-power input and output. There were no significant differences in power draw on these radios.

Receiver sensitivity is the ability of the radio to hear a weak signal. Normally stated in microvolts, marine VHF receiver sensitivity runs from 0.22 to 0.35, with industry groups recommending a minimum of 0.50 microvolts. Each VHF was tested for the minimum signal it could receive at a specific industry standard



*Testers used a bait freezer set at 15 degrees to simulate cold-weather extremes.*

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setting between background noise and generated signal (12 dB SINAD). All the radios proved more than sensitive enough to pick up very weak signals.

We did not have the equipment to test each radio for selectivity, which is the ability of the receiver to reproduce only the signals transmitting on the selected channel, not signals on other nearby channels. The manufacturer selectivity specs are listed in the Value Guide (pages 16-17); a higher number is better.

The display unit on each radio was rated based on the size and readability of the display screen, the quality of the information displayed, and the backlighting.

One very important function of the marine VHF radio is its ability to reproduce the sounds of incoming voice communications via internal audio amplifier and speaker. If you can't hear the audio, it doesn't really matter how well the transmitter or receiver work. To rate the audio system of each radio, we measured the sound pressure levels at maximum volume while inputting a 1 kHz tone. Measurements were taken at 1 meter. Testers also rated each audio system by monitoring a weather channel and rating the sound quality. All produced acceptable sound quality.