

Introduction from Gordon West

Welcome to the world of long distance communications with marine single sideband (SSB) radio. Hundreds of voice and data e-mail channels in the MF and HF frequency spectrum have been allocated to mariners for long-range, ship-to-ship, and ship-to-shore communications. Marine single sideband, voice, "party line" communications can never be replaced by ship satellite "private" communications! The advantage of marine SSB is the ability to have a multiparty conversation for the exchange of information. Satellite communications is like a telephone call - you can only talk to a specific person at a specific time. You cannot talk to a group of individuals. An SSB gives mariners the ability to share information with one another about weather, ports of call, cruising conditions etc. Marine SSB is more like an internet chat group than a phone call.

The marine single sideband service and frequencies have been around for years. However, only recently have we seen the introduction of low-cost, no-crystal, marine SSB equipment that can offer marine radio, ham radio, and marine e-mail capabilities in one neat, 12-volt DC package. ICOM, a leader in marine, commercial, and amateur radio equipment, presents the overview of the marine single sideband service, an easy-to-understand review of equipment, and suggested installation of the radio and antenna and ground systems.

If you are like most mariners, you are probably not all that interested in what makes SSB radio work on the inside. However, one thing is for sure, when you pick up the mic or prepare to send a computer e-mail message, you want the very best signal on the band, and you want to connect with the station you are calling, on the first try!

In this book we'll show you how, in a non-technical, easy-to-understand language. We will also give you some proven installation techniques that will help you to install the equipment on your boat if you are handy with tools. But, keep in mind that your marine electronics

dealer is an expert in this field. They have the experience to complete a proper installation of your equipment. If you don't feel you have the necessary skills, your dealer is the best person you can find to insure proper installation and top performance from your marine SSB radio.

This handbook is also a ready reference for the hundreds of voice and data (e-mail) channels available in the maritime service, as well as channels and frequencies for ship-to-ship and ship-to-shore in both the marine service and the amateur radio service. We'll even show you how to tune in weather facsimile and NAVTEX.

TIP!

All frequencies listed have been updated in early 1997, with no anticipated changes for the next few years.

Ready to communicate throughout the world on your marine SSB transceiver? Do you want to pick up that microphone and immediately make a quick phone call home? Want to send a FAX or e-mail? Ready to receive weather information over your lap-top computer? If so, then read on—ICOM presents the very best in marine single sideband and we will give you a fun and easy-to-understand look at long-range radio.

Start with a Good VHF Set

Before you begin thinking about marine SSB long distance communications, let's first review the hard working marine VHF radio system.



ICOM's IC-M59 VHF set is shown with optional flush mount kit.

Radio rules require that you must have a marine VHF radio in your vessel before you can install a marine SSB transceiver.

The international marine VHF service is designed for coastal cruising. We use marine VHF when we are within 20 miles of a shore station or another VHF equipped vessel. This is the effective range of the VHF receiver.

The VHF system is worldwide. Whether you cruise to Hawaii, Bermuda, or the Mediterranean, the VHF/FM channels are the same as they are here. Just use the international (INT) button on your radio. The frequencies assigned to channels may be different in the US, Canada or the rest of the world.

Your typical ship-to-shore VHF range to the Coast Guard should be about 20 miles. You can normally hear weather broadcast stations WX-1, WX-2, and others, up to 80 miles away. The marine WX channels are available only in the US and Canada. The range to a marine telephone operator should be at least 20 miles. Ship-to-ship range is better than 10 miles.

If you are not achieving this minimum range, check out your VHF antenna system and all connections. For sailboats, the best type of antenna is one that is mounted on the mast with good quality cable down to your set. Keep a portable antenna as a spare in case of dismasting. Sailboat masthead antennas will generally pull in stations and transmit further than any other type of antenna system. These antennas are only 3' tall and have "3dB" gain. They use the height of the mast head to achieve maximum range.

For powerboats, you should use a minimum of an 8-foot "6dB" antenna. If you have a large more stable vessel, you might want to select a 21-foot, 9dB gain antenna that performs well in all but heavy seas. A good powerboat antenna installation will normally let you reach out to the distances described above.

A good quality, high-tech, VHF transceiver is also important to obtain maximum range. ICOM produces both handheld and permanently installed marine VHF transceivers. These installed radios (with options) meet minimum digital selective calling (DSC) requirements. DSC is a new system for making distress calls. This system will be implemented worldwide over the next several years. Deep Draft (over 300 tons) vessels put into service since 1992 comply with this system now. All such vessels must comply by early 1999. Ultimately recreational vessels will need DSC VHF radios to communicate with DSC equipped ships. It is expected that all new marine VHF radios approved for sale in the US will be DSC equipped by 2001-2002. An ICOM DSC VHF set connected to your onboard GPS gives you added automatic safety communications in case of an emergency. The DSC radio will transmit an emergency call that includes your vessel's position taken from the GPS. See the wide variety of ICOM VHF sets at your favorite marine electronics dealer.

You must have a VHF set on board and a current FCC ship station license before a single sideband radio may be installed. If you have a licensed VHF system aboard, and you need more than 20+ miles of range when out at sea, then single sideband communications is your next step.

The Marine Single Sideband (SSB) Service

Don't let the words "single sideband" scare you. It's simply a type of radio transmission. The military has been using single sideband for years to transmit messages throughout the world. Ham radio operators, who are permitted to select almost any type of worldwide transmission mode, have been using single sideband for years on worldwide frequencies, to talk to their buddies anywhere and everywhere.

In 1971, the Federal Communications Commission (FCC) phased in SSB transmissions for the long distance marine radio service. At the same time, it introduced the expanded marine VHF service for local communications. It also phased out the older double sideband sets.

A single sideband signal concentrates your voice onto a tightly compacted radio wave capable of traveling from hundreds to thousands of miles. This very efficient, compacted radio signal is a faithful reproduction of your actual voice. Unlike a commercial AM broadcast station, that sends out duplicate double voice wave forms plus an energy robbing "carrier," marine single sideband eliminates the unneeded mirrorlike lower sideband, the power robbing "carrier" that does nothing more than hush background noise when nothing is on the air. Marine SSB puts all of the radio energy from your voice into a compacted upper sideband wave form that gives you worldwide talk power.

If you don't speak into the mic, your transmitter doesn't put out any energy. Only when you speak will radio energy jump out into the air

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waves. In between each word, your transmitter and battery system relax! This means that you can talk further with less current demands from your battery system.

Your compressed, upper sideband signal, is captured by a distant receiver, and that receiver converts your radio signal into crystal clear reception.

When the FCC phased out double sideband equipment and introduced SSB, it doubled the number of available channels for marine communications. More new SSB channels were also added in 1991!

By compressing the transmitted signal into a very narrow band width, distant receivers are able to reject almost half the normal noise and interference level from the air waves. FCC-required frequency tolerances keep SSB sets precisely on frequency to minimize that sound distortion on receive. By simply adjusting a single "clarifier" knob on your SSB receiver, you can produce the normal sounding voice that was transmitted by a distant ship or shore station.

Coast Guard

Since safety at sea communications deserve the highest priority, let's first examine the United States Coast Guard and its role in the high frequency marine single sideband service. Our Coast Guard and other distress agencies throughout the world, guard 2182 kHz as the International Distress frequency. This allows you to contact shore-side and marine rescue agencies immediately when outside of VHF Channel 16 range. Since 2182 kHz is an international distress frequency, you will find that there are literally thousands of stations guarding this channel for a distress call, 24 hours a day.

In 1999, 2182 was replaced by 2187.5 as the International Distress frequency. This new frequency assignment is part of the new GMDSS service required on vessels over 310 tons. Use of 2182 will be phased out and replaced by digital (DSC) watch on 2187.5.

The United States Coast Guard also offers additional working channels on its Automated Mutual-Assistance Vessel Reserve frequencies in each of the popular single sideband bands. Imagine using your marine SSB set to place a call for help when you're thousands of miles away from any shore station. Through the Coast Guard AMVER system, they can readily pinpoint the position of commercial and military vessels passing through your area and signal them to immediately alter course and steam to your location to render assistance. Believe it or not, you just thought you were all alone out on the ocean. There are actually many commercial and military vessels that could reach you within a matter of hours accounted for and pinpointed via SSB AMVER system radio communications. The AMVER system uses a full range of SSB frequencies to provide world-wide safety to ocean-going vessels. See appendix for frequencies.

Phone Home?

Want to place a telephone call? Shore-side commercial telephone stations are standing by on hundreds of frequencies to place your phone call. These shore-based phone companies operate extensive transmitting and receiving antenna systems to bring in your signals loud and clear. Remember, their revenue depends on your satisfaction. You can be assured that they have the most going for them when it comes to powerful transmitters, sensitive receivers, and huge antenna arrays that beam in on your single sideband signal. These same telephone stations also transmit "traffic lists" for ships at sea who have telephone calls waiting from shore-side parties. They also broadcast weather reports, storm warnings, and other notices to mariners where safety at sea is important. If an emergency should arise the phone companies with their massive antenna systems can also patch you into rescue coordination centers, hospitals, and emergency-at sea medical systems without charge. See appendix for frequencies.

E-Mail

Your new marine SSB can also send and receive electronic mail over public common carrier, narrow band direct printing channels. It is just like sending e-mail from your home or office through a specific using your secret password over phone lines. SSB e-mail relies on the

airwaves and ionosphere in place of phone lines. Your e-mail provider can be reached from anywhere in the world with up to 12 network stations standing by for your computer traffic. An e-mail connection will provide a significant \$\$\$ savings over conventional, high-frequency, SSB voice or satellite-phone communications from your vessel to your business or home; or to anyone who has an e-mail or FAX capability on shore. Shore stations can automatically reach your computer, by dialing a single phone number to get to your e-mail network provider. If you have a lap-top computer onboard, your present or new ICOM SSB may need only a small modem and software to complete the e-mail connection.

More about SSB e-mail in Chapter 3, with a complete listing of narrow-band direct printing frequencies listed in the appendix, plus a map showing a radio e-mail electronic worldwide network of stations also found in the appendix.



It is a plug-in affair to hook your marine SSB into e-mail via the airwaves.

Ship-To-Ship

There are many ship-to-ship frequencies allocated for communicating over long distances to other vessels with marine SSB gear. Without incurring any "land line" charges, you can communicate from one ship to another ship in opposite parts of the world, free of charge, with crystal clear reception. Thanks to Mother Nature, which we'll talk about

in a few moments, your signals can travel thousands of miles to other vessels with SSB equipment with almost no loss of voice quality. See appendix for frequencies.

Ship-To-Shore For Free

Private shore stations share ship-to-ship channels. This allows you to communicate directly with a marine supply company that can help you replace the part that fell off your anchor windless 3,000 miles away. There is no land line charge in this communication service because you are transmitting directly to a distant marine parts or marine electronics store. These "private coast stations" can also include private marine business, yacht club and marine salvage companies, private air ambulance companies, and any other type of marine business that need to regularly communicate over hundreds or even thousands of miles to distant ship stations. You may even be able to set up a marine SSB base station at your office to stay in touch regarding marine matters when you're far out at sea. Your sideband may also be operated in the SITOR mode, allowing for digital-transmission and reception of documents, such as yacht race standings, business transactions, and detailed manifests. See appendix for voice and SITOR frequencies.

Shortwave

Your marine SSB radio from ICOM can also be used to receive (and in certain cases, transmit) other services that share frequencies adjacent to the marine band.

You can tune into worldwide international broadcast stations and find out the latest news, here and abroad. You can eavesdrop on military and State Department communications that fill the high frequency spectrum. See appendix for frequencies.

Weather Facsimile Charts Free

You can tie your weather facsimile receiver into your marine sideband set and receive crystal clear weather charts in your particular area of cruising. See appendix for frequencies.

Ham Radio

You can also tune into amateur radio frequencies, and listen for local weather reports on the maritime mobile amateur radio nets. Licensed amateur operators may use ICOM SSB transceivers that are capable of transmitting on amateur frequencies. The "No Code Technician" license allows you worldwide ham privileges when cruising within Mexico with a valid Mexican reciprocal operating permit. And even if you don't obtain the ham license to talk, all ICOM marine SSB transceivers easily tune into ham calls so you can listen to the valuable maritime mobile weather nets, both upper and lower sideband.

Military

Use your marine SSB set as an ultra-sensitive shortwave receiver You can tune into foreign embassies, the Air Force and the Navy, "secret" shortwave stations, and any other type of communications that can be found on the worldwide high frequency spectrum.

Time Signals

Oh yes, one last thing—if you forgot to set your watch, you can tune into the international time signals wherever you cruise. Tick, tick tick, at the sound of the tone, it is exactly. . . See appendix for frequencies.

Worldwide Reception for Free

If time ticks don't interest you, consider the following that can be received on your new marine single sideband, all-band transceiver:

- U.S. Air Force in-flight communications
- Strategic Air Command
- Air Force 1 (the President's plane)
- Civil Air Patrol
- United States Intelligence Agencies
- Antarctic Stations
- Interpol
- U.S. Weather ships
- Hurricane Research Center
- Volmet-Aviation Weather Broadcasts

Morse Code News and Weather for Free

It's also possible to tune in radio facsimile broadcasts and CW Morse code broadcasts from national news agencies, i.e. United Press International and Associated Press. These broadcasts take place on international frequencies that can be picked up just about anywhere in the world. There are Morse code readers and teleprinter displays that are easily hooked up to your ICOM transceiver and will instantly read out what is being sent! It's almost as good as your morning newspaper.

While your ICOM marine SSB may be capable of transmitting on any or all of these frequencies, you should not! Transmitting outside of your authorized maritime and ham limits is illegal. If you hold a valid amateur radio license, you will be permitted to transmit on ham bands—but transmitting outside of the marine and ham bands would be illegal except in an emergency to signal for help.

So get that modem and lap-top computer hooked up your ICOM marine SSB by the plug-in jacks on the back.

- Send and receive e-mail.
- Tune into weather facsimile broadcasts, and watch the weather charts unfold on your computer screen. Decode the dots and dashes of Morse code computer programs.
- Tune into Navtex broadcasts from the Coast Guard, and check out the latest weather report or navigational warning.
- Your computer and your SSB make a perfect marriage to add information and safety to your cruising.

High Frequency Bouncing Radio Waves

Marine single sideband transceivers broadcast in the "high frequency" range of the radio spectrum. Unlike VHF (very high frequency) communications that always travel line-of-sight, transmissions in the "high frequency" region take advantage of Mother Nature for some extra long distance communications.

As of July 1, 1991, the following frequency bands have been allocated for marine single sideband service:

2 MHz	6 MHz	12 MHz	18 MHz	25 MHz
4 MHz	8 MHz	16 MHz	22 MHz	27 MHz

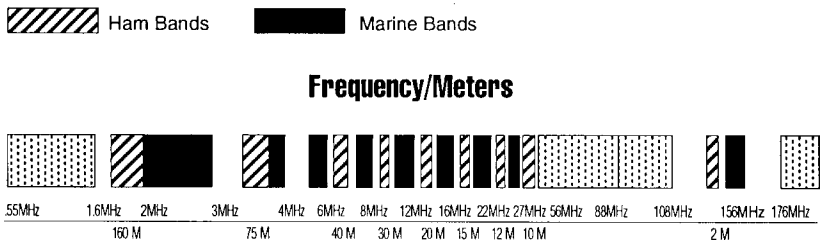


FIGURE A

When transmitting on any band, one component of your radio signal hugs the surface of the ocean. This is called the ground wave. Ground waves that hug the surface of the earth and ocean travel approximately 50 to 200 miles from your transmitter. If you are communicating on single sideband with a nearby shore station or another boat less than 100 miles away, chances are it's the ground wave component of your signal that's doing all the work. Your ground wave signal is always there, day or night, and does not depend on anything other than a good, strong transmitted signal.

Good ground wave coverage out to 150 miles depends on a good antenna and a good radio frequency ground system aboard your boat. The better your antenna and grounding, the further you can communicate via ground waves. More on this later!

It's the "sky wave" component of your transmitted radio signal that gives you long distance, single side band range. Sky waves are the components of your transmitted radio signal that travel up into the air and bounce off of the ionosphere and are reflected back to earth hundreds and even thousands of miles away.

The ionosphere surrounds our globe and is present 24 hours a day. Its density and reflecting capabilities change with day and night, the season of the year, and the 11-year solar cycle. Hanging like an invisible radio mirror between two stations, the ionosphere is responsible for reflecting back to earth marine SSB waves that strike it at the right angle.

"The right angle" to establish communications with a station, let's say 3,000 miles away, depends on the time of day you are broadcasting and the particular band of frequencies you are using. Lower frequencies tend to bounce back to earth close in. Frequencies around 12 MHz tend to bounce back to earth over fairly long distances, typically 3,000 miles. 22 MHz may give us the longest bounce, enabling you to communicate from the West Coast of the United States into the Mediterranean. If the ionosphere is very strong, you may get a second bounce off your sky wave signal, which enables you to talk twice the distance that you normally would. On 22 MHz, this means that you can easily talk all the way around the world on a double-hop or triple-hop transmission.

The ionosphere is constantly changing, and a frequency that you communicated on yesterday might not be suitable for communications today. Often the time of day and season of the year will make a difference. When band conditions change in the ionosphere, you simply change frequencies on your ICOM to maintain a good, clear signal. With multiple frequencies and multiple bands available, you can stay in touch as the ionosphere goes through its regular ups and downs.

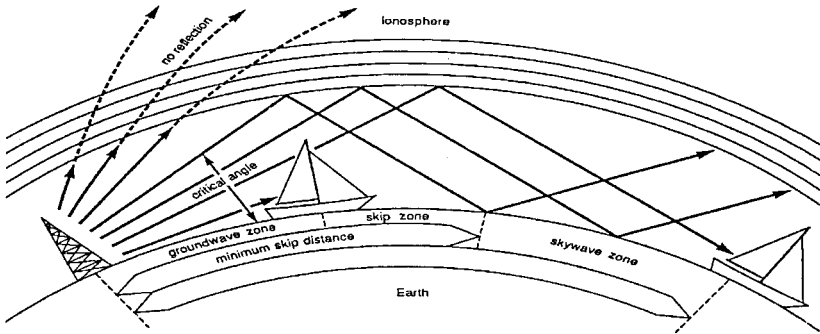


FIGURE B

At night, the ionosphere gradually lowers. Your signals won't be able to bounce as far, however, you will still enjoy several thousand miles of communications range.

During daylight hours, the ionosphere rises, giving you longer range on higher frequencies. Since it's the sun's rays that charge up the ionospheric layers, solar and other disturbances will sometimes enhance— and sometimes occlude—single sideband marine communications.

Sky waves are unaffected by local weather conditions. Whether it's sunny or cloudy, snow or rain, windy or still, your sky wave range will not be influenced by local weather conditions.

Did You Know?

The only time you will hear "weather noise" on your transceiver is in the proximity of lightning and thunderstorms. Lightning may be picked up as far away as 200 miles on lower frequencies. It sounds like a static crash at the exact same time that you see the bolt illuminate. Some mariners leave their SSB radio turned on while cruising at night in inclement weather to get prepared for storm cells. When they hear it on the radio they should be prepared to see it soon!

After a few weeks of playing around with your new single sideband radio telephone, you will begin to get a feel for the expected range on any one particular band of frequencies. In our next chapter, we'll give you some secrets!

Single Sideband Range

Your transmitted ground waves are seldom influenced by atmospheric or ionospheric conditions. Here is what to expect in ground wave range, 24 hours a day:

SSB Ground Wave Range			
2 MHz	-	150 miles	
4 MHz	-	100 miles	
6 MHz	-	75 miles	Anytime,
8 MHz	-	70 miles	day or night
12 MHz	-	50 miles	
16 MHz	-	50 miles	
VHF Band (156 MHz)	-	8 miles vessel-to-vessel	
		25 miles to Coast Guard	

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Sky waves give you the very longest range, thanks to the ionosphere. Here's what to expect in solid communication range to distant ship and shore stations:

SSB SKY WAVE RANGE		
FREQUENCY BAND	DAYTIME RANGE	NIGHT TIME RANGE
2 MHz	Sky waves absorbed	1,000 miles
4 MHz	Sky waves absorbed	1,500 miles
6 MHz	500 miles	2,000 miles
8 MHz	700 miles	3,000 miles
12 MHz	1,500 miles	Worldwide in the direction of the sun.
16 MHz	3,000 miles	Worldwide in the direction of the sun until 8 p.m. local time.
22 MHz	Worldwide	Little sky wave reflection after sunset.
25 MHz	Worldwide	Little sky wave reflection after sunset.

As you can see, to talk further, go to a higher frequency. However, watch out—you can sometimes select a frequency that is too high. This may cause your sky wave signal to actually bounce over the station that you wish to communicate with, or go off into space.

If your signal is literally skipping over the desired station, switch to a lower frequency.

After a few weeks of tuning your receiver to different stations, you will be able to anticipate which band will be the best for a particular time of day to talk to a specific station hundreds or thousands of miles away. Try tuning your set during the day, and then at night, and listen to the

difference in range. Switch between bands and begin to get a feel for how the ionosphere causes signals to skip long distances, and sometimes short distances.

Marine telephone shore stations make it easy to predict the best band to establish rock-solid communications. Every four hours they read a traffic list (calls being held for vessels at sea) as well as ocean weather conditions. They simultaneously transmit this information on each one of the authorized bands. Simply switch bands while they are transmitting and determine which band offers the best reception. Where you hear them loudest is where they will hear you best. After they finish with their traffic list, give them a short call and you have now established communications, thanks to sky waves and Mother Nature's reflective ionospheric mirror.

CHAPTER 6

Band and Channel Selection

It's easy to program additional frequencies and channels with today's modern, high-frequency, marine single-sideband transceivers. You don't need to purchase expensive plug-in crystal elements. Everything is synthesized, and your modern ICOM marine SSB receives from .5 MHz through 29.999 MHz, and transmits from 1.6 MHz to 27.500 MHz.

The marine single-sideband service uses specific channels to identify specific frequencies between 4 MHz and 27.5 MHz. This book has a listing of channels and frequency assignments in the appendix. On the 2 MHz band, we use actual frequencies not International Telecommunications Union (ITU) channel designators. We use ITU channel designators on frequencies between 4 MHz and 27.5 MHz.

Most mariners will use about 10 frequencies in each marine band. New ICOM marine SSB transceivers offer over 300 channels that are synthesized, for voice, and an additional 600 channels for electronic

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e-mail. ICOM marine transceivers also offer over 100 channels that are user-programmable, perfect for ham frequencies, shortwave broadcasting stations, weather facsimile frequencies, and just about any other frequency that you might want to tune in and listen.

You can add, change, or delete frequencies yourself by entering the proper numbers on the keypad. Most ICOM marine electronic dealers can custom program local frequencies to save you the time of entering them into memory using the key pad.

Did You Know?

Your ICOM marine SSB can also work in any mode, including lower sideband or ham channels on 40 meters and 80 meters, without the need to buy an expensive lower sideband filter.

Plan your communications range by selecting the appropriate bands. If you're not going to be communicating halfway around the world, then don't program many channels above 16 MHz. If you are only going to Mexico, or to the Caribbean, load up on 4 MHz, 8 MHz, and 12 MHz frequencies and channels. More than likely, these frequencies and channels are already loaded into your equipment.

Equipment Selection and Location

Locate your marine SSB in a place that is convenient for operation. The radios are large and heavy. They should be positioned for easy access to all controls. Most of the time your SSB set can nestle right along with your other nav gear.

You can build the equipment into your instrument panel, however, you should provide some ventilation. Many new SSB's are fan coded and there needs to be a source of fresh air to facilitate this process. Everything on the inside of the radio is transistorized, and slight amounts of heat are actually good for the equipment—it dries things out.

TIP!

We recommend keeping the equipment down low for easy channel selection. Make it comfortable to operate. Some night in a cozy harbor you may wish to simply flip through the worldwide frequencies to pick up some action. You want the set as accessible to your hand as possible without any undue effort.

ICOM SSBs have a built-in speaker that faces forward. This eliminates having to purchase an external speaker which is required when the built-in speaker is located elsewhere. A good carpenter can build a teak frame that will make the equipment look nice. An anodized aluminum trim kit is also available from your ICOM dealer. A heavy-duty mounting bracket is shipped with each rig to facilitate mounting it from below or hanging from above.

Once you have selected an ideal location for mounting the equipment, read on, because we'll take a look at power requirements, antennas, and grounding.

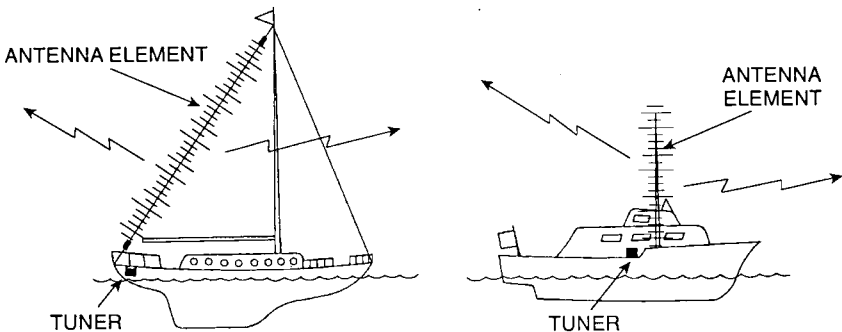
◆ *Installation Recommendations*

Automatic Antenna Tuner Mounting Locations

- (1) Aboard sailboats, the automatic antenna tuner normally feeds an insulated section of rigging, such as a backstay or, on a ketch, a mizzen sidestay. The automatic tuner hides away, below, near the chain plate that holds this particular insulated stay. The automatic tuner should go as far away from the radio as possible in order to minimize RF feedback.

TIP!

FCC rules require the active antenna tuner to be located as far away from people as possible. In other words, don't mount the tuner in an area where someone could actually touch the high voltage output single wire terminal!



■ ANTENNA TUNER

- (2) The automatic tuner requires no specific orientation. You can hang it vertically or horizontally. You should insure that it will stay relatively dry and the water drain screws (if any) are at the low point of the unit if it is going to get wet.
- (3) Remove the downward-facing drain screw to provide an escape path for trapped moisture.

- (4) Aboard powerboats, the automatic antenna tuner normally feeds a fiberglass whip. If possible, mount the tuner up in the flying bridge area, well protected from the weather. Mount it as far away from the helm as possible. If there is no flying bridge on the powerboat, the tuner may be mounted near the base of the white fiberglass whip.
- (5) The wire feeding your antenna system is high-voltage "GTO-15." It is available at most marine electronic stores. Although it looks like coaxial cable, it is not. The jacket contains no internal braid. This means the high-voltage single wire is part of your active antenna system, and should be routed far away from other wires aboard. Keep it away from sleeping quarters or areas where crew members might sit. It's always a good idea to keep everyone at least 5 feet away from the GTO-15, antenna lead wire.

Did You Know?

It is normal to hear your automatic tuner make a clicking sound during tune-up. What you are hearing are the internal relays self-adjusting inductance and capacitance for the best possible match. The clicking will normally stop after about 5 seconds of initial tune-up. The tuner will remain silent during normal communications on marine SSB. The clicking sounds during normal tune-up are a positive indication that your system is performing as it should. However, if the clicking continues for more than 10 seconds, chances are the tuner is missing its ground connection or the antenna connection up on deck.

Grounding (Counterpoise)

Good grounding or counterpoise techniques are absolutely necessary for maximum single sideband range. Half your antenna is your radio frequency ground, so don't skimp here! The radiating portion of your antenna needs to see a mirror image of itself before it will send out your SSB signal. This mirror image, called a counterpoise, is created by using metal surface and seawater as your radio frequency ground plane.

Your marine single sideband system will not perform satisfactorily if you don't have a good counterpoise system. Poor counterpoise (ground) equals poor range. This is especially true on lower frequencies where large RF grounds (counterpoise) are required for good range.

If you make direct contact with the seawater, you may be able to reduce the amount of ground foil that must be run from your radio and the automatic tuner. If your through-hulls are metal and are all bonded with a green wire per ABYC (American Boat & Yacht Council) standards, find a couple of in-water bronze through-hulls, and run the foil directly to them for an effective seawater ground. But make sure that bronze through-hull is already part of your bonding system with a telltale green wire attached to it and going off to other underwater metals. Never ground to a bronze through-hull that has been specifically left isolated and ungrounded.

Use a wire brush to clean up the neck of the through-hull, and then use a hose clamp to affix the copper foil to that through-hull. Bunch the foil up a few times to provide a good solid connection where it won't easily rip.

TIP!

If there are several bonded underwater through-hulls near your automatic antenna tuner, your grounding will be easier. You might only need 50 feet of ground foil to complete the entire process! Direct contact with seawater improves any RF ground system.

Same thing for a powerboat—but you'll need more ground foil because your automatic antenna tuner is probably mounted up top on the flying bridge. In this case, you will need to follow a wire run channel from the top of the flying bridge down below decks, and down to the bilge area where you can make connection to underwater through-hulls. You could even use a metal tube that may already be in place as part of your ground foil run.



Use 3-inch wide, 3-mil copper foil to ensure a good sea water ground.

Why foil? Round wires create inductive reactance at radio frequencies, and are not effective as a good grounding conveyance. Use 2 or 3 inch wide, 3 mil copper foil (available at most marine electronic stores) to achieve a good seawater ground.

Your counterpoise system needs to begin directly below your antenna feed-point if at all possible. When you use an antenna coupler, we will consider this as the "feedpoint."

An ideal counterpoise for all frequency single side band work should consist of up to 100 square feet of metal surface area directly below the feedpoint. While this may sound like an impossible number of square feet to achieve, consider the following large surface RF ground planes (counterpoise) already available to you:

- | | |
|------------------------|--|
| Tanks | Stainless steel tuna towers/stanchions |
| Propeller and shaft | Chain plates |
| Encapsulated lead keel | Engine block |
| Bonded through-hulls | |

You can develop your own large surface area RF ground plane (counterpoise) system by fiberglassing into your hull copper screen or 2-3 inch wide copper foil strips. It's too bad they didn't build in the ground plane when they laid up the hull, isn't it?

It will probably take you about a day and a half and a hundred feet of copper foil to create a good capacity ground plane below the water line. You will be running copper foil inside your hull for a capacitive ground to the seawater. No, the foil does not go on the outside of the hull! The fact that the ground foil is close to the seawater makes all the difference on transmit and receive range. While it might be an effort to get all this foil below the water line, it will really make the difference when you press down on your microphone key.

Did You Know?

Your bonding of underwater metals that are already tied in with a common ground wire will not affect your corrosion control system. If your present underwater metals are not all bonded together, you may wish to lay out a RF ground system (counterpoise) independent of an actual connection to the seawater but that's not really necessary.

These other copper foil leads go directly to the antenna tuner. The tuner will have a ground terminal to which the foil is attached. Do not reduce

the size of the foil as you approach the tuner or the radio. Also, do not convert the foil to wire as you approach the tuner or the radio. Fold the foil back on itself and drill a hole for the mounting stud.

Your RF ground system (counterpoise) does not actually need to contact the seawater to be effective. Even though an encapsulate lead keel doesn't actually touch the seawater, it makes a capacitive ground by being next to the seawater, if you run wide copper foil to it.

You may either double bolt the foil to an exposed keel bolt, or actually tap directly into the lead keel with a bolt going through the copper foil and into the lead.

In attaching to through-hulls, remember, it will improve performance if you run foil between each through-hull. Stainless steel hose clamps are the best way to "pick up" these underwater metals. Water tanks, copper hydraulic lines, etc.; can also be connected with foil using hose clamps.

I know, I know, trying to get a good RF ground (counterpoise) system is a bit difficult—especially if you can't get at your keel bolt. If this is the case, then drill into the keel and pull up some lead. Any sailboat system that doesn't use a poured keel is losing a tremendous amount of potential in obtaining a super signal. Only if your keel is made of lead shot poured in fiberglass would you not elect to use it. In any other case, where there is a large amount of surface area below the water line, such as a lead keel, by all means use it in your RF ground plane counterpoise. It will save you many hours of trying to run more copper foil and screen below decks.

Good RF grounding (counterpoise) techniques will also enhance your overall protection from a lightning strike. Lightning protection and good RF grounding all have a common denominator—a large amount of surface area below the water line.

Again, I would like to mention that running wire—even battery cable—is not effective as an RF ground (counterpoise) at radio frequencies. Although, wire looks like a good DC ground, it looks invisible at most

radio frequencies. Use foil, and only foil. Even aluminum foil will work in a pinch. You can even use aluminum air conditioning foil with sticky on the back as counterpoise. Wires won't work so forget about using them.

The more counterpoise, the better your signal. Ever wonder why supertankers always have the loudest signals on the band? They are only using 100-watt equipment, and a standard 23-foot antenna, but their signal literally bounces off of their gigantic counterpoise.

TIP!

Again, RF grounding IS the key to single sideband super range. It's one of the few components of the installation you can control.

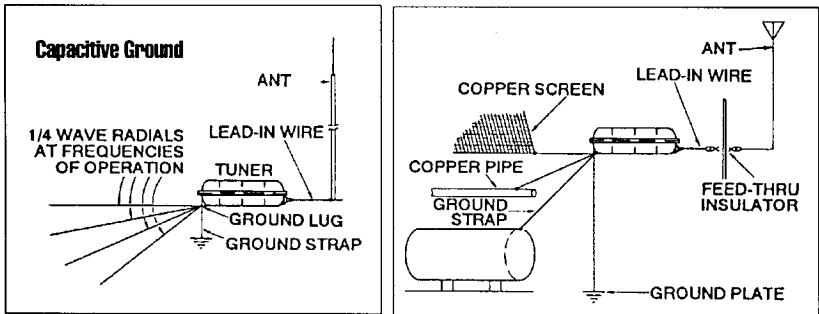
Once the copper is in place, you can just about forget it. It will do the work for you. We recommend applying a thin coat of paint or resin over the copper to keep the salt water from tarnishing it. While green copper works just as well as bright, shiny copper, it's a much more sanitary installation to keep it isolated from the elements. It also prevents tearing or other damage to the system.

If you have soldered all copper joints, you won't need to check for continuity. However, you may wish to clean up copper connections at through-hull fittings every couple of years. Since these connections are made with hose clamps, there is the possibility that the contacts may get corroded after a few years in the bilge. A steel brush should bring both the copper and the through-hull fitting up to a nice shiny surface, and you can make your connection again.

The periodic inspection of your copper ground system, you can be assured that your signal will stay loud and clear.

◆ *Ground System Review*

- (1) The automatic tuner must be connected to a good electrical ground. A good ground prevents shocks, interference and numerous other problems. One example of a good ground is the nearest metal member on a metal vessel. For best results, use metal strap or foil. Make the length as short as possible.
- (2) Good ground systems on wood or fiberglass boats are more difficult to install. For best results, use strap or foil connected to the keel, tanks, or other large metal objects.



If you have no way of contacting the seawater, you could install a counterpoise for each band of frequencies used above 4 MHz, as shown in the figure. This would be a last resort!

Ground plates? We save the underwater ground plate as an absolute last resort for a single-sideband antenna system that is working off of an automatic antenna tuner. Ground plates provide terrific contact to the seawater, and also have good connection points to attach the foil. The porous ground plates don't achieve any better ground than if you were to come up with your own copper plate, but they do provide a superior means for mounting them through the hull. Using a ground plate as a RF ground may cause interference with other on board electronics using the same ground plate as a DC ground.

The automatic antenna tuner performs best with a direct seawater ground connection. Whether it be through your bonded underwater through-hulls, or to a dedicated ground plate, the direct connection is one great way to minimize hours spent in the bilge developing a good-ground system.

TIP!

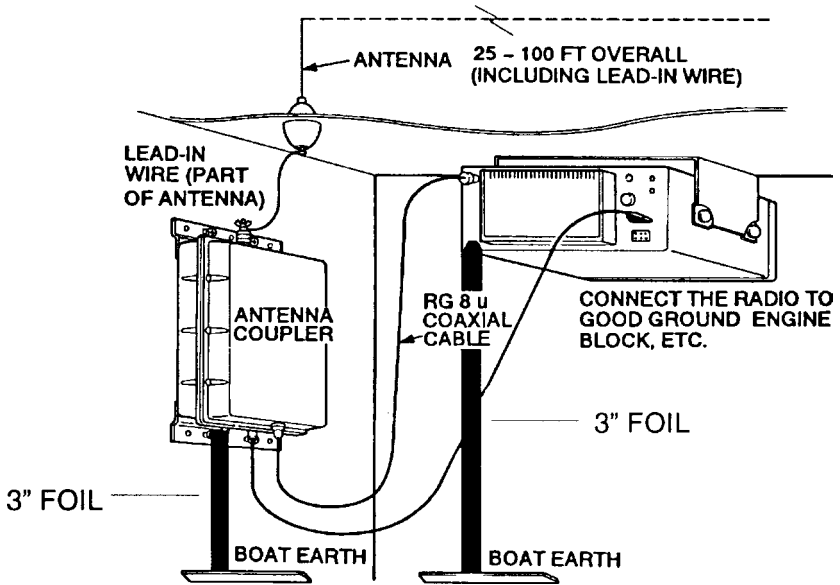
A capacitive ground system, made up of copper strips run around the hull below the water line, or individual copper strips at one-quarter wavelength sections, is one way to achieve a good ground, but may take several days to lay into the hull and keep dry. Why not go for the direct seawater contact, and establish your single-sideband ground connection in hours instead of days!

◆ *Typical Installation*

The following figure shows a typical installation. Any radio communications system operating with a whip antenna or long wire antenna (insulated back stay) must have an adequate ground connection, otherwise the overall efficiency of the radio installation is degraded especially at low frequencies.

The 50 ohm output impedance of the transceiver makes it necessary to employ antennas of the trapped or externally matched type. The use of an antenna coupler in conjunction with a whip antenna or long wire antenna (insulated back stay) allows an efficient installation which will cover all HF marine bands.

Of course, those of you with aluminum hull vessels, your RF groundplane (counterpoise) is your hull, and you'll probably have the loudest signal anywhere in the world. No further RF grounding is necessary.



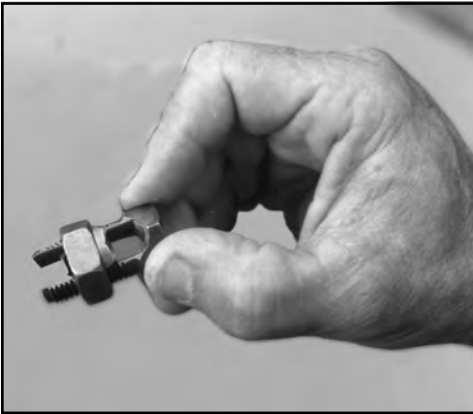
CHAPTER 9

Antennas

To achieve the ultimate in long skywave range, you need an antenna system that is a minimum of 23 feet long tied into your automatic antenna tuner. The longer the antenna, the better!

For powerboats, your antenna will be a 2 or 3-piece, fiberglass whip. The fiberglass whip, on a powerboat, is mounted on the port or starboard side with an upper support bracket. It is fed with single wire GTO-15 that connects the whip to the nearby automatic antenna tuner. This whip is sufficient for most powerboats.

For sailboats, insulating one of the stays "in the clear" is the best way to achieve an antenna system that is between 30 feet and 70 feet long. An insulated backstay is the most popular choice. The insulators are put on by professional riggers. The rigger should place the top insulator at a point where it is about 3 feet from the mast. The bottom



Use a stainless steel hose clamp or brass kearny nut to make your connection.

insulator, on a single backstay, is placed at eye level. Any lower and someone might actually touch the hot part of the antenna. Any higher and it's tough to service the connection point. Keep it at eye level.

On a split backstay, where the split is below the masthead, use three (3) insulators. The top and bottom insulators are installed on the side of the backstay to be

used as the antenna. The other insulator should be placed near the top of the split leg as close to the Y as possible. This effectively takes the split out of the antenna system. Run the GTO-15 up the stay to a point above the lower insulator.

Use a stainless steel hose clamp to make your connection. You can also make the connection with a brass kearny nut available at electrical houses. Make sure that there is a good contact between the GTO-15 single wire and the insulated stay. **NEVER USE COAX!** Use rigger's tape to completely seal the connection, and at least once a year check your connection to insure it is making a good electrical contact with the stay.

On a ketch, you can insulate either the port or the starboard main stays, or you could insulate a mizzen stay and achieve good results. I like the mizzen stay better than the port or starboard stay, because it is more likely to be outside of and away from other rigging. Anytime you provide an antenna that is part of your rigging that is surrounded by other rigging, you lose valuable transmission and reception range. On sailboats, with all sorts of grounded rigging, your antenna must be outside of this rigging, and in the clear, to transmit and receive over long range.

If your insulated stay may come in contact with other metals, or could be touched by someone on deck, use rigger's tape or plastic stay covers to keep it isolated. Always keep in mind that everyone on deck needs to stay away from your transmitting antenna when you are actually on the air with the microphone keyed. On receive, the antennas are harmless. But on transmit, new FCC rules require everyone stay clear of the radiating antenna.

Remember, where ever you install GTO-15 (a "hot" part of your antenna system) along a metal component of the vessel, you should cut any green bonding wire that connects that component to ground. If the backstay chain plate is bonded, cut the bonding wire to that chain plate. If you have installed GTO-15 next to a stanchion, that stanchion should be removed from the bonding system. This prevents that

powerful SSB signal from going right back to ground rather than radiating from your antenna



Whip antenna mounted over a stainless steel rail

Pre-Tuned 6-Foot Whip

A pre-tuned 6-foot whip containing both ham and marine radio frequencies will work nicely on both powerboats and sailboats. The whip does not require an automatic antenna tuner, so what you pay for the whip will actually be less than what you would have paid for an automatic antenna tuner. Your range with the whip is about 30% less than you would get with an automatic tuner connected to a long antenna wire.

The Whip Must Be Mounted Over A Horizontal Stainless Steel Rail!

The whip cannot be mounted on wood, nor can it be mounted on fiberglass. These pre-tuned whips **MUST** be over a horizontal rail with at least 3 feet of surface area on each side of the whip.

For sailboats, the whip goes where you normally put the hibachi or outboard motor. Keep it away from the self-steering metal wind vane or wind generator.

On powerboats, the pre-tuned whip is placed over any horizontal rail, with the rail around the flying bridge most preferred. This gets the energy up and away from everyone down below. Remember, everyone must be at least 5 feet away from any transmitting high frequency antenna system.

The whip features plug-in "taps" to cause the antenna to self-resonate on specific marine radio or ham radio frequencies. Each tap point is marked in MHz for marine band, and meters for the ham band. You simply plug in the banana plug to the appropriate jack, and you are on the air with your self-tuned antenna system.

The self-resonant whip antenna gives good results up to a 3,000 miles range. But each time you switch from one marine MHz band to an other one, you must send someone out to the whip to tap into the appropriate band that you plan to operate on.

Adding 12 Volts

Your transceiver will be shipped with a red and black power cord. This is your 12-volt connection, and it is fused.

A 150-watt marine single sideband transceiver can draw over 30 amps on voice peaks. It's only when you talk that current is consumed in these proportions so don't worry, it's not 30 amps continuous out of your battery when the mic button is pressed down!

It's recommended to hook up your 12-volt connections directly to your ship's battery system. This allows you to stay on the air in case of a malfunction of your electrical panel. This is when you may need your set the most.

If you have some hefty 12-volt wires leading from your battery compartment to your fuse panel, a second choice would be to go ahead and make your connection at the instrument panel. Clip off large amounts of extra power cable, but always leave enough coiled up behind the radio so you can pull it from its mount with enough cable to work on the set turned on.

Route your power cable along the same track as your RF ground foil. Watch out for those sharp edges so that they don't nick the cable. Don't even think about using the RF ground foil as the black side of the power cable—these are two separate "ground" systems. One is for 12 volts DC and the other is for radio frequencies!

Use wire lugs to attach the cable to the terminal strip. The radio power lead is already fused, you do not necessarily need to go through an external circuit breaker; you can if you want, but that adds one more "weak link" in your power cable assembly.

TIP!

If you run the power cable to your battery system, choose a battery that is less apt to fail in an emergency. If you have a separate battery that is located above the water line, choose it in case of flooding. Just as soon as seawater covers your batteries, you are off the air—just when you wish you were on.

If you need to extend the wires supplied by the factory, see the wire table below. Make certain that any splices are well soldered and are protected from the salt environment. Soldering with radio solder is the preferred method. Measure the distance from the battery to the radio and back to the battery.

CONDUCTOR SIZED (AWG) FOR 3% VOLTAGE DROP AT 12 VOLTS													
	Current (AMPS)												
LENGTH	5	10	15	20	25	30	40	50	60	70	80	90	100
10'	18	14	12	12	10	10	8	8	6	6	6	4	4
15'	16	12	10	10	8	8	6	6	4	4	4	2	2
20'	14	12	10	8	8	6	6	4	4	4	2	2	2
25'	14	10	8	8	6	6	4	4	2	2	2	1	1
30'	12	10	8	6	6	4	4	2	2	2	1	1/0	1/0
40'	12	8	6	6	4	4	2	2	1	1/0	1/0	1/0	1/0
50'	10	8	6	4	4	2	2	1	1/0	1/0	2/0	3/0	3/0
60'	10	6	6	4	2	2	1	1/0	2/0	2/0	3/0	3/0	4/0
70'	10	6	4	2	2	2	1/0	2/0	2/0	3/0	3/0	4/0	4/0
80'	8	6	4	2	2	1	1/0	2/0	3/0	3/0	4/0		
90'	8	4	4	2	1	1/0	2/0	3/0	3/0	4/0			

Use 3% voltage drop for any "critical application" affecting the safety of the vessel or its passengers: bilge pumps, navigation lights, electronics, etc.

Eliminating Noise Interference

Now that you have your SSB station completely installed, it's time to turn it on and start listening to the bands. Your antenna tuner system is automatically set close enough on receive that you should hear plenty of signals. Notice that there is more atmospheric noise on the lower frequencies than the higher frequencies. With your engines and other motors turned off, the noise is the usual type of background racket prevalent on every band until a signal appears.

TIP!

Strong signals will usually completely mask out noise. Weak signals on 2 and 4 MHz will only quiet the noise by about 50 percent. The more sensitive your receiver, the more atmospheric noise you are going to pick up—this is normal. **Poor receivers don't pick up background noise!**

Atmospheric noise is always there—on any frequency, but louder on lower frequencies. It can not be filtered out—to do so would also cause your distant radio signals to fade away.

The noise that can be filtered is electrical noise generated by the ignition system of your engine, plus noise from other motors onboard. Fluorescent lights also create noise that is usually heard on the lower frequencies. Other noise sources: fans, refrigeration, battery voltage monitors, inverters, computers and battery chargers.

Onboard noise sources should be filtered at the spot they are generated. There are filters for alternators, and filters for fluorescent lights. You can put resistor spark plugs on your gas engine, and electronic tachometer filters on your electronic tachs. Fuel pumps can be quieted down, and bait tanks silenced, with specific filters designed for each individual interference source.

TIP!

Tune in a relatively weak signal on your SSB set, and then start the engine. If the signal is still there, your interference noise problems are few. However, if the signal completely disappears—you will need to get some filters for each noise interference source.

For noises and interference external to your boat, such as a passing skiff with an outboard that can be heard clearly on your SSB set, simply turn on your noise-blanker switch on the front of your radio. This will cancel out the repetitious popping sound almost completely. It may also help on your fluorescent lights. Although the noise-blanker built into your set is one way of dampening repetition-type noise, noise filters at the source of the noise are the best way to go. Like plugging leaks, you must methodically get every single one.

Your FCC License

Did You Know?

Marine SSB operation still requires a Federal Communications Commission marine station license, as well as a restricted operators permit. Even though the Federal Communications Commission has stopped licensing certain VHF radio systems, your longer range marine single side band still needs the proper call letters.

FCC Form 506 must be completed, following all instructions carefully. If you already have a valid VHF license, you will still use Form 506, but indicate that you are requesting a modification.

Form 506 is rather complex, but give it your best try by indicating "fee type code" as "PASR", and a licensing fee for 10 years at \$75. Be sure to answer "Yes" on requesting a new or modified maritime mobile service identity number. This will give you capabilities for digital selective calling.

Check the category of transmitters for VHF, all EPIRB types, SSB for both bands, radar at 9300-9500 MHz, RTTY, and satellite. If you already have a selective call number be sure to list it. Same for your INMARSAT number—if you have one, list it!

Read the fine print on the form, and then send it on to the Federal Communications Commission. It may take several tries to get the license to go through; but when it does, you will be all set for your new marine SSB system.

Complete FCC Form 753 for your personal operators permit. This is called the restricted operators permit, and it's necessary for all SSB installations. If you will be carrying passengers for hire, you also need

a marine radio operators permit. This requires a simple multiple-choice test to make sure you know how to run and operate a marine radio telephone. For information about the marine radio operators permit, and a simple book that prepares you for the test, call 1-(800) 669-9594 and ask for the Gordon West Commercial General Radiotelephone book.

The Federal Communications Commission may also have these forms on the Internet (<http://www.fcc.gov>), and you may be able to go on-line and apply for all of this right at the computer.

Going on the Air

Your new marine SSB transceiver has been pre-programmed by the manufacturer, a dealer, or distributor that sold the equipment. It is easy to reprogram different frequencies into your new equipment. Refer to your owner's manual for programming instructions. It's just as easy as pushing buttons on your telephone. Go on, give it a try!

The Federal Communications Commission requires that your marine station license is valid and covers the frequencies 2,000 kHz to 27,000 kHz or 2 MHz to 27 MHz before transmitting. Make sure you have this license posted before going on the air.

If you followed the installation instructions precisely for both your radio equipment and the automatic antenna tuner, your radio should perform up to specifications. If you have any questions, you might want a technician to check it out. The instruction manual with your new ICOM SSB lists several ways to verify full power output.

TIP!

Before transmitting on any frequency, listen! In fact, spend a complete week listening to different frequencies and different bands to get a feel for how marine SSB communications take place.

When listening to ship-to-ship and ship-to-private shore station calls, you will generally hear both sides of the conversation. This will give you an idea of how ship-to-ship communications take place. Always remember to give your official FCC call sign at the beginning of your transmission, at least once every 10 minutes, and when you sign off.

When tuning into the ship-to-shore marine telephone station, you will only hear the shore station side of the conversation. The marine telephone frequencies are duplex. Ship stations transmit on different

frequencies than the shore stations. Your ICOM SSB automatically knows where to transmit when tuned to the shore station telephone companies. The very professional marine telephone operators and their service technicians will expertly ask you the questions about where you are, who you are, and what number you want. Simply follow their instructions and you will have no problems communicating through the telephone service.

The same thing holds true with the United States Coast Guard AMVER stations. You will only hear the shore side of the conversation. The United States Coast Guard personnel expertly extract all of the information they need for any emergency. Once again, do a lot of listening before making any calls.

Probably your first call will be for a radio check. Don't use the United States Coast Guard or 2182 kHz for radio checks as they have far more important matters than giving out signal reports all day long.

When you are ready for a radio check, try the distant high seas marine operator. Wait until they are finished with their local weather reports before giving them a call. Always choose the band that sounds the strongest to you.

Follow the procedures for initiating a call in the upcoming chapters of this handbook. The marine telephone companies, if they're not real busy, are more than happy to accommodate a radio check.

You can also receive radio checks from other pleasure boats that you might hear on ship-to-ship frequencies. Most commercial vessels will probably ignore any calls for radio check, so try to select one that sounds like a fellow pleasure boat mariner, and exchange signal reports. You should generally receive reciprocal reports. If a station sounds very weak to you, they will probably say that you are weak to them. Same thing with the telephone service; if they're not coming in strong, you won't either.

Weak signals are not necessarily a result of something wrong with your installation. Sometimes ionospheric band conditions simply won't

favor any particular single sideband band. Try the next band up to improve signal reports. Try a different time of day, and expect that some days you'll have better signal levels than others.

Did You Know?

Since your radio waves are solely dependent on ionospheric conditions, it's quite normal for signal levels to change. You may also notice that signals will fade in and out on the higher frequencies, such as 12, to 27 MHz. Again, this is completely normal and should result in almost no loss of intelligibility during a call.

Another fun way to check the operation of your equipment is to receive as many foreign broadcast stations as possible. Refer to the back of this book for a listing of international shortwave transmitting stations. These stations should normally come in loud and clear, but are still subject to 20 second fades. If you are hearing plenty of activity on these frequencies, plus strong signals from other boats and shore stations, chances are your installation is working fine, and you will enjoy worldwide communications with single sideband equipment.

If you decide to have a licensed technician check out your equipment, most marine electronic dealerships will be more than happy to send a tech with the proper field strength equipment to "sign off" your station. Since you completely installed the equipment yourself, there will be little that the technician will need to do other than to check out your antenna tuner setup, double check all connections to insure that they are weatherproof, and to make some field strength measurements and exchange signal reports with distant stations. Since electronic technicians are quite familiar with the characteristics of single sideband frequencies, they can quite accurately assure you that your set is on the air and operating perfectly. If there is any way that they can squeeze a few more watts out of your system, they will also do that. Have them sign your log book with their license number to further verify that your system is 100 percent "go."

Operating Procedures - Distress, Urgency and Safety

If you have an emergency, plan to use your VHF set as well as your marine single sideband to call out for help. If you are within 100 miles of the shore, first try your VHF on the international distress channel, Channel 16. If you are far out to sea and do not receive immediate response on VHF Channel 16, your next step is to switch to long-range single sideband.

First try 2187.5 kHz, the international distress call for marine single sideband. If after three attempts you do not receive an immediate reply to your distress call, then switch to any frequency where you hear strong signals. The marine operator is always a good one. Use any frequency on your marine sideband that will get a response from another station.

Here are the procedures for placing or acknowledging a distress call on your marine single side band, as well as for your VHF marine transceiver. These are the approved procedures as outlined by the Radio Technical Commission for Maritime Services in cooperation with the Federal Communications Commission.

◆ *Spoken Emergency Signals*

There are three spoken emergency signals:

(1) Distress Signal: MAYDAY

Distress signal MAYDAY is used to indicate that a mobile station is threatened by grave and immediate danger and requests immediate assistance. MAYDAY has priority over all other communications.

(2) Urgency Signal: PAN-PAN (Properly pronounced PAHN-PAHN)

Used when the safety of the vessel or person is in jeopardy.

"Man overboard" messages are sent with the Urgency signal. PAN-PAN has priority over all other communications with the exception of distress traffic.

(3) Safety Signal: SECURITY (Pronounced SAY-CURITAY)

Used for messages concerning the safety of navigation or giving important meteorological warnings.

Any message headed by one of the emergency signals (MAYDAY, PAN-PAN, or SECURITY), must be given precedence over routine communications. This means listen. Don't transmit. Be prepared to help if you can. The decision of which of these emergency signals to use is the responsibility of the person in charge of the vessel.

◆ **Radiotelephone Alarm Signal** [notes indicate this rule changes in 1999 -- 2187.5]

This signal consists of two audio frequency tones transmitted alternately. This signal is similar in sound to a two-tone siren used by some ambulances. When generated by automatic means, it shall be sent as continuously as practicable over a period of not less than 30 seconds nor more than one minute. The purpose of the signal is to attract the attention of the person on watch or to actuate automatic alarm devices. The radiotelephone alarm signal shall be used only with the distress signal except in the situation discussed in the section dealing with the Urgency Call and Message Procedures.

◆ **Distress Call and Message**

SENDING: Distress Call and Message

First send the Radiotelephone Alarm Signal, if available.

- (1) Distress signal MAYDAY (spoken three times)
- (2) The words THIS IS (spoken once)
- (3) Name of vessel in distress (spoken three times) and call sign (spoken once)

The Distress Message immediately follows the Distress Call and consists of:

- (4) Distress signal MAYDAY (spoken once)
- (5) Name of vessel (spoken once)
- (6) Position of vessel in distress by latitude and longitude or bearing (true or magnetic, state which) and distance to a well-known landmark such as a navigational aid or small island, or in any terms which will assist a responding station in locating the vessel in distress. Include any information on vessel movement such as course, speed, and destination.
- (7) Nature of distress (sinking, fire, etc.)
- (8) Kind of assistance desired
- (9) Any other information which might facilitate rescue, such as: length or tonnage of vessel, number of persons on board, and number needing medical attention, color of hull, decks, cabin, masts, etc. (10) The word OVER

EXAMPLE: Distress Call and Message

(Send Radiotelephone Alarm Signal, if available, for at least 30 seconds but not more than one minute)

"MAYDAY-MAYDAY-MAYDAY
THIS IS-BLUE DUCK-BLUE DUCK-BLUE DUCK-WA 1234
MAYDAY-BLUE DUCK
DUNGENESS LIGHT BEARS 185 DEGREES
MAGNETIC-DISTANCE 2 MILES
STRUCK SUBMERGED OBJECT
NEED PUMPS-MEDICAL ASSISTANCE AND TOW
THREE ADULTS-TWO CHILDREN ABOARD
ONE PERSON COMPOUND FRACTURE OF ARM
ESTIMATE CAN REMAIN AFLOAT TWO HOURS
BLUE DUCK IS THIRTY-TWO FOOT CABIN CRUISER
BLUE HULL-WHITE DECK HOUSE
OVER"

NOTE: Repeat at intervals until answer is received. If no answer is received on the Distress frequency, repeat using any other available channel on which attention might be attracted.

◆ *Acknowledgment of Distress Message*

If you hear a Distress Message from a vessel and it is not answered, then YOU must answer. If you are reasonably sure that the distressed vessel is not in your vicinity, you should wait a short time for others to acknowledge. In any event, you must log all pertinent details of the Distress Call and Message.

SENDING: Acknowledgment of Receipt of Distress Message

Acknowledgment of receipt of a Distress Message usually includes the following:

- (1) Name of vessel sending the Distress Message
(spoken three times)
- (2) The words THIS IS (spoken once)
- (3) Name of your vessel (spoken three times)
- (4) The words RECEIVED MAYDAY (spoken once)
- (5) The word OVER (spoken once)

EXAMPLE: Acknowledgment Message

"BLUE DUCK-BLUE DUCK-BLUE DUCK-WA 1234
THIS IS-WHITE WHALE-WHITE WHALE-WHITE
WHALE-WZ4321
RECEIVED MAYDAY
OVER"

◆ *Offer of Assistance*

After you acknowledge receipt of the distress message, allow a short interval of time for other stations to acknowledge receipt, if any are in a position to assist. When you are sure of not interfering with other

distress-related communications, contact the vessel in distress and advise them what assistance you can render. Make every effort to notify the Coast Guard. The offer-of-assistance message shall be sent only with the permission of the person in charge of your vessel.

SENDING: Offer-of-Assistance Message

The Offer-of-Assistance Message usually includes the following:

- (1) Name of the distressed vessel (spoken once)
- (2) The words THIS IS (spoken once)
- (3) Name of the calling vessel (spoken once)
- (4) The word OVER (spoken once)
- (5) (On hearing an acknowledgment, ending with the word OVER from the distressed vessel, continue with your offer of assistance message.)
- (6) Name of calling vessel and radio call sign (spoken once)
- (7) The word OVER (spoken once)

EXAMPLE: Offer-of-Assistance

To be sent after a short interval of time, but long enough to be sure that further transmissions will not cause harmful interference and long enough to work out relative position and time to reach the distressed vessel:

"BLUE DUCK-THIS IS-WHITE WHALE-OVER
(on hearing the word OVER from BLUE DUCK, continue)
I AM PROCEEDING TOWARD YOU PROM TEN MILES
WESTWARD EXPECT TO ARRIVE IN ONE HOUR
COAST GUARD HAS BEEN NOTIFIED INCLUDING
YOUR NEED FOR DOCTOR
I HAVE ONE INCH PORTABLE PUMP
PLEASE ADVISE IF MY ASSISTANCE IS NOT NEEDED
WHITE WHALE-WZ4321-OVER"

◆ *Urgency Call and Message Procedures*

The Urgency Call begins with the emergency signal, consisting of three repetitions of the group of words PAN-PAN (pronounced PAHN-PAHN). The Urgency Call and Message is transmitted on VHF Channel 16 (or 2182 kHz, in the same way as the Distress Call and Distress Message). The Urgency signal PAN-PAN indicates that the calling person has a message concerning the safety of the vessel, or a person in jeopardy. The Urgency signal is authorized for situations like the following:

- Transmission of an urgent storm warning by an authorized shore station.
- Loss of person overboard but only when the assistance of other vessels is required.
- No steering or power in shipping lane.

SENDING: Urgency Call and Message

The Urgency Call and Message usually include the following:

- (1) The Urgency signal PAN-PAN PAN-PAN PAN-PAN
- (2) Addressee-ALL STATIONS (or a particular station)
- (3) The words THIS IS (spoken once)
- (4) Name of calling vessel (spoken three times) and call sign (spoken once)
- (5) The Urgency Message (state the urgent problem)
- (6) Position of vessel and any other information that will assist responding vessels. Include description of your vessel, etc.
- (7) The words THIS IS (spoken once)
- (8) Name of calling vessel and radio call sign (spoken once)
- (9) The word OVER

EXAMPLE: Urgency Call and Message

(Not involving possible use of radiotelephone alarm)

"PAN-PAN PAN-PAN PAN-PAN-ALL-STATIONS
(or a particular station)
THIS IS-BLUE DUCK-BLUE DUCK-BLUE DUCK
HAVE LOST MY RUDDER
AM DRIFTING TOWARD SHORE AND REQUIRE TOW
SEVEN PERSONS ON BOARD
BLUE DUCK IS THIRTY-TWO FOOT CABIN
CRUISER - BLUE HULL
WHITE DECK HOUSE
THIS IS-BLUE DUCK-WA 1234
OVER"

◆ *Safety Call and Message Procedures*

The Safety Call, headed with the word SECURITY (SAY-CURITAY, spoken three times), is transmitted on the Distress and Calling frequency (VHF Channel 16 or 2182 kHz), together with a request to shift to a working frequency where the Safety Message will be given. The Safety Message may be given on any available working frequency.

United States Coast Guard stations routinely use the Safety Call SECURITY to alert boating operators that they are preparing to broadcast a message concerning safety of navigation. The call also precedes an important meteorological warning. The Safety Message itself is usually broadcast on Coast Guard Channel 22A (157.1 MHz) and 2670 kHz. Although recreational boating operators may use the Safety Signal and Message, in many cases they would get better results and perhaps suffer less criticism by giving the information to the Coast Guard without making a formal Safety Call. The Coast Guard usually has better broadcast coverage from its shore stations and will rebroadcast the information if it is appropriate.

SENDING: The Safety Call and Message

The Safety Call usually includes the following: (On VHF Channel 16 or 2182 kHz.)

- (1) The Safety Signal SECURITY (spoken three times)
- (2) Addressee-ALL STATIONS (or a particular station)
- (3) The words THIS IS (spoken once)
- (4) Name of vessel calling and radio call sign
- (5) Announcement of the working channel (frequency) where the Safety Message will be given
- (6) Radio Call Sign
- (7) The word OUT

The Safety Message usually includes the following: (Select working channel (frequency) announced in step 5 above)

- (1) The Safety Signal SECURITY (spoken three times)
- (2) The words ALL STATIONS (spoken once)
- (3) The words THIS IS (spoken once)
- (4) Give the Safety Message
- (5) Repeat the Radio Call Sign
- (6) The word OUT

EXAMPLES: Safety Call and Message

(On VHF Channel 16)

"SECURITY-SECURITY-SECURITY-ALL STATIONS
THIS IS-BLUE DUCK-WA 1234
LISTEN CHANNEL 68
WA 1234-OUT"

(On VHF Channel 68)

"SECURITY-SECURITY-Security-ALL STATIONS
THIS IS-BLUE DUCK-WA 1234
A LOG APPROXIMATELY TWENTY FEET LONG
TWO FEET IN DIAMETER ADRIFT OFF HAINS
POINT
POTOMAC RIVER
WA 1234-OUT"

◆ *Coast Guard Channels*

The government frequency 2182 kHz and 2670 kHz are widely used by recreational boating operators for communicating with U.S. Coast Guard shore stations and ship stations, and with USCG Auxiliary vessels when these vessels are operating under orders. When using these channels, you must first establish communications on the appropriate calling frequency, 2182 kHz on the following long range Coast Guard channels:

COAST GUARD CHANNELS			
Your Transmit	Your Receive	I.T.U. Channels	Remarks
2182 kHz	2182 kHz	None	International distress & calling frequency to all Coast Guard & Rescue agencies worldwide.
2670 kHz	2670 kHz	None	U.S. Coast Guard working channel.
4134 kHz	4426 kHz	424	500-mile Coast Guard working channel.
6200 kHz	6501 kHz	601	Gulf Coast Guard working channel.
8240 kHz	8764 kHz	816	Medium-range Coast Gaurd working channel.
12242 kHz	13089 kHz	1205	Long-range 24-hour Coast Guard working channel.
16432 kHz	17314 kHz	1625	Day/evening long-range Coast Gaurd working channel.

TIP!

Consult your ICOM SSB frequency chart to see where these channels are in your set's memory.

◆ Operating Procedures - Regular Communications

It's very important that you monitor a frequency at least one minute prior to transmitting over it. This insures that you won't "cover up" any communications that may be going on that you might not hear clearly at first. Always wait until a frequency is clear before transmitting.

The following procedures for operating your marine SSB are approved by the Radio Technical Commission for Maritime Services in cooperation with the Federal Communications Commission:

Safety Frequencies

The following table describes the distress and safety frequencies between 4000-27,500 kHz for ship and coast stations, public and private, operating voice radiotelephony (HF-SSB).

SAFETY FREQUENCIES	
FREQUENCY	CHANNEL DESIGNATOR
4125.0	"4 Safety"
6125.0	"6 Safety"
8291.0	"8 Safety"
12290.0	"12 Safety"
16420.0	"16 Safety"

Operating Procedures (other than Distress, Urgency and Safety)

◆ *Maintain a Watch*

Whenever your marine VHF or SSB radio is turned on, keep the receiver tuned to the appropriate distress and calling frequency, 156.8 (VHF Channel 16) or 2182 kHz. This listening watch must be maintained at all times the station is in operation and you are not actually communicating. The Coast Guard maintains a silent period on 2182 kHz for three minutes immediately after the hour and for three minutes immediately after the half hour. During these silent periods only messages or transmissions concerning distress or urgency are made.

Since this watch is required for safety and to facilitate communications by providing a common calling channel, it is not permissible for one vessel in a fleet of vessels traveling together to maintain this watch while the other vessels guard another channel, such as a common intership channel. You may maintain a watch on a working channel, however, and may establish communications directly on that channel provided you simultaneously maintain your watch on the distress and calling channel.

Record the times you maintain this watch in your Radio Log.

◆ *Choose the Correct Channel or Frequency*

Ship-to-Ship Channels

Each of the marine frequencies and channels is authorized for a specific type of communication. It is required that you choose the correct channel for the type of communication you are making. For example, certain channels are set aside exclusively for intership use. See the following chart.

SHIP FREQUENCIES (SIMPLEX) (USB)

MINIMUM RANGE	INFORMAL CHNL CODE	FREQUENCY kKz	BEST TIME
50 miles	Ship 2-A	2065.0	Night
50 miles	Ship 2-B	2079.0	Night
50 miles	Ship 2-C	2096.5	Night
50 miles	Ship 3-A	3023	Night
150 miles	Ship 4-A	4146	Night
150 miles	Ship 4-B	4149	Night
150 miles	Ship 4-C	4417	Night
170 miles	Ship 5-S	5680	Day/Night
200 miles	Ship 6-A	6224	Day/Night
200 miles	Ship 6-B	6227	Day/Night
200 miles	Ship 6-C	6230	Day/Night
200 miles	Ship 6-D	6516	Day/Night
400 miles	Ship 8-A	8294	Day
400 miles	Ship 8-B	8297	Day
1000 miles	Ship 12-A	12353	Day
1000 miles	Ship 12-B	12356	Day
1000 miles	Ship 12-C	12359	Day
5000 miles	Ship 16-A	16528	Day
5000 miles	Ship 16-B	16531	Day
5000 miles	Ship 16-C	16534	Day
5000 miles	Ship 18-A	18840	Day
5000 miles	Ship 18-B	18843	Day
10,000 miles	Ship 22-A	22159	Day
10,000 miles	Ship 22-B	22162	Day
10,000 miles	Ship 22-C	22165	Day
10,000 miles	Ship 22-D	22168	Day
10,000 miles	Ship 22-E	22171	Day
10,000 miles	Ship 25-A	25115	Day
10,000 miles	Ship 25-B	25118	Day

◆ *Calling Another Ship*

Turn your radiotelephone on and listen on the appropriate distress and calling frequency, 2182 kHz, to make sure it is not being used. If it is clear, put your transmitter on the air. This is usually done by depressing the "push to talk" button on the microphone. (To hear a reply, you must release this button.)

Speak directly into the microphone in a normal tone of voice. Speak clearly and distinctly. Call the vessel with which you wish to communicate by using its name; then identify your vessel with its name and FCC assigned call sign. Do not add unnecessary words and phrases as "COME IN BOB" or "DO YOU READ ME." Limit the use of phonetics to poor transmission conditions.

This preliminary call must not exceed 30 seconds. If contact is not made, wait at least two minutes before repeating the call. After this time interval, make the call in the same manner. This procedure may be repeated no more than three times. If contact is not made during this period, you must wait at least 15 minutes before making your next attempt.

Once contact is established on 2182 kHz, you must switch to an appropriate working frequency for further communication. You may only use VHF Channel 16 and 2182 kHz for calling, and in emergency situations.

Since switching to a working frequency is required to carry out the actual communications, it is often helpful to monitor the working frequency you wish to use, briefly, before initiating the call on 2182 kHz. This will help prevent you from interrupting other users of the channel.

All communications should be kept as brief as possible and at the end of the communication, each vessel is required to give its call sign, after which, both vessels switch back to the distress and calling channel in order to reestablish the watch.

Two examples of acceptable forms for establishing communication with another vessel follow:

EXAMPLE 1	
VESSEL	VOICE TRANSMISSION
BLUE DUCK (on 2182 kHz)	"MARYJANE-THIS IS-BLUE DUCK-WA 1234"
MARY JANE (on 2182 kHz)	"BLUE DUCK-THIS IS-MARY JANE- WA 5678-REPLY 8A" (or some toher proper working channel.)
BLUE DUCK (on 2182 kHz)	"8A" ie "ROGER" (If unable to replay on the channel selected, an appropriate alternate should be selected.)
BLUE DUCK (on working channel 8A)	"BLUE DUCK"
MARY JANE (on working channel 8A)	"MARY JANE"
BLUE DUCK (on working channel 8A)	(Continue with message and terminate communications within three minutes. At the end of the communications, each vessel gives its call sign.)

EXAMPLE 2	
VESSEL	VOICE TRANSMISSION
BLUE DUCK (on 2182 kHz)	"MARYJANE-BLUE DUCK-WA 1234-REPLY"
MARY JANE (on 4A)	"MARY JANE-WA 5678"
BLUE DUCK (on 4A)	"BLUE DUCK" (Continues message and terminate communicaitons as indicated in example 1)

A short form most useful when both parties
are familiar with it

Using Your SSB for Low-Cost E-Mail



Marine SSB will accept the radio modem and computer on rear accessory plugs.

Your new SSB transceiver may have many channels designated for narrow-band direct printing (NBDP). These are frequencies for simplex telex over radio (SITOR) which has been the established mode of maritime communications for the merchant shipping industry for more than 50 years. SITOR is electronic e-mail over marine frequencies. All you need is a computer and a radio modem to complete the marriage to your marine SSB. With this equipment, you will be able to send and receive e-mail over worldwide frequencies.

Using your lap-top computer and a special modem and your new ICOM SSB, you can send and receive written text messages far more efficiently than voice messages. Written messages allow you to think through what you want to say ahead of time, format your message off-line in your computer, and then send it off with a few keystrokes, right from your vessel at anytime, day or night, anywhere in the world. Your SITOR one-third page of text can go in less than 2 or 3 minutes or often less than the minimum air time voice telephone charge. If you have several pages of text, it could take up to 10-30 minutes, but you are assured of "solid copy" at the other end of the

circuit. You can also receive e-mail as well. Inbound traffic for your vessel is saved in your vessel's own mailbox in the host computer until you are ready to receive it. People on shore can access the system by the Internet, or any one of the several commercial e-mail system such as CompuServe, AOL, Telex, FAX, or voice transcription, using the public telephone system via any of the common carriers. You can also use your computer and your SSB to receive, free of charge, weather facsimile imagery directly from the Coast Guard. You can also receive high-quality weather forecast charts in your mailbox for downloading at your convenience through private yacht weather forecasting companies.

Electronic e-mail over marine SSB circuits are carried on by more than 200 radio telex shore stations in the world as described in the admiralty list of radio signals. All of these worldwide data stations have been coordinated in respect to international billing arrangements for ships of all nations which wish to connect to any foreign coast station along the route of their voyage. Two companies, Globe Wireless, and PinOak Digital offer worldwide networks of pickup and relay stations with only one administration to deal with as you make your international voyage. These networks, of high-frequency coast radio stations are designed to provide both spacial and frequency-diverse channel capacity to all mariners around the globe. Multiple propagation paths together with automated control of the ship's existing high-frequency SSB radio system provide transmission quality and link availability not previously obtainable on similar voice circuits. Traffic lists, message traffic, and other data services are sent throughout all of the world wide network e-mail stations, and downloaded easily with your shipboard lap-top computer.

The typical cost for a SITOR message is about \$2.00 a minute, where approximately 300 characters can be sent per minute. This works out to be about three cents per word. If you plan to send high volumes of data on your computer on an almost daily basis, PinOak Digital and Globe Wireless offer other types of high speed data transfer systems that allow you to send and receive messages in about one-tenth the time as normal SITOR.

Did You Know?

For more information about the Globe Wireless e-mail connection to your ICOM SSB, contact Globe Wireless at (800) 876-7234.

For more information about PinOak Digital High Frequency Digital Communications, call (800) 746-6251.

For more information about SAILMAN visit their website at www.sailmail.com

CHAPTER 16

Review: SSB Channel Designators Explained

Your friends with marine SSB may tell you. . .

To talk local, you want to go on 4A. They sometimes call that 4-alpha. It's good in the mornings, and 4-alpha on your set is 4-2. Some sets have it as 4-1, but that's really 4-S. You can look up this channel as 451, which is really 4146. Got it?"

The mysteries of SSB channelization get worse. Did you know that international distress frequency 2182 kHz may NOT be the best place to cry Mayday when you are halfway across the sea?

Single Sideband

And if you call Mayday on Coast Guard working channel 816 or 1205, they could be "duplexing" a weather report and not listening to their input frequency. So WHO do you call in an emergency, anyway, on marine SSB?

And what about making phone calls? Are you really charged \$25 just for getting an answering machine? I am happy to report, NO.

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So let's demystify that new marine SSB installation, and compare the channels and frequencies listed in this chapter with what is stored in your SSB's memory.

ALL THOSE CHANNELS. Marine SSB frequencies are assigned specific channels within the following megahertz regions:

MEGAHERTZ REGIONS		
CHANNEL	MHZ	APPROXIMATE RANGE
2 XX	2 MHz	100 miles day; 1000 miles night
4 XX	4 MHz	100 miles day; 1500 miles night
6 XX	6 MHz	500 miles; 1500 miles night
8 XX	8 MHz	700 miles day; 2000 miles night
12 XX	12 & 13 MHz	100 miles evenings; 3000 miles days
16 XX	17 & 17 MHz	Unreliable evenings; 4000 miles days
22 XX	22 MHz	Daytime only band, worldwide

Each band of marine frequencies skips off the ionosphere and refracts signals back down to earth at different angles. 2 and 4 MHz come back down relatively close to your vessel. 8 and 12 MHz are excellent for medium-range, day and night, skywave "skip" contacts. On 16 and 22 MHz, skywaves fade out at night, but offer the longest range during daylight hours. **The best range usually follows the direction of the sun.**

Choose the megahertz range that will skip your signal to the approximate distance you want to reach. 8 and 12 MHz are the favorites during the day, and 4 and 6 MHz are the favorite bands during the night. 2 MHz is clobbered with noise, and you won't get zip. 22 MHz is too high for reliable daily contacts. Choose 8 and 12 MHz as your "bread and butter" bands.

Marine radio channels are assigned ITU designators. ITU stands for International Telecommunications Union, and assigns commonality to every country's marine SSB set.

But there are differences between each manufacturer of SSB equipment on how they read out the channels, so stay tuned. More to follow.

Most 2 MHz frequencies have little use even 2182 MHz, the international distress and calling frequency. The range is so limited, you would do better to squawk Mayday on VHF channel 16. Most 2 MHz frequencies go by their actual numerical frequency kilohertz, not by three-digit channel designators. Lucky for us, a kilohertz readout on the radio dial is common among all marine SSB radios in every country.

4 MHz to 22 MHz marine channels are all listed by a three-digit or four-digit channel designator. An example would be marine Channel 401, or marine Channel 809, or marine Channel 1206. These channel numbers, common worldwide, are assigned to pairs of radio frequencies that make up a radio channel. Both the marine telephone companies of the world and the United States Coast Guard and rescue agencies throughout the world operate on frequency PAIRS where they transmit on one frequency, and listen on another. This is called DUPLEX. But you don't need to worry about the individual frequencies for ship transmit and ship receive because your marine SSB has all of these channels pre stored in ITU memory. If you dial up marine Channel 808, your set automatically receives on 2740 kHz, and transmits automatically on 8216 kHz. It is pre-stored duplex, so all you need to know is the channel number and what service goes with which channel numbers.

Currently, AT&T runs the high seas maritime radiotelephone services from three stations that serve this half of the world. However in the future, access will be through station WLO out of Mobile Alabama. AT&T will be limiting the service provided by KMI, WOM, and WOO. From Australia to Africa and everything in between, the AT&T marine operator offers you radiotelephone service on the following channels:

AT&T MARINE OPERATOR

AT&T SAN FRANCISCO KMI	AT&T FLORIDA WOM	AT&T NEW JERSEY WOO
401, 416, 417	403, 412, 417	410, 411, 416
804, 809, 822	423, 802, 810	808, 811, 815
1201, 1202, 1203	814, 825, 831	1203, 1210, 1211
1229, 1602, 1603	1206, 1208, 1209	1605, 1620, 1626
1624, 2214, 2223	1215, 1223, 1601	2201, 2205, 2210
2228, 2236	1609, 1610, 1611	2236
	1616, 2215, 2216	
	2222	

TIP!

Choose the channel on a likely frequency that will skip your waves into the particular AT&T maritime services station closest to you. If you're in the South Seas, you might try Channel 1602 to AT&T coast station in California. If you're in the Caribbean, try AT&T coast station in Florida on Channel 403. And if you're sailing to Spain, you might to try AT&T coast station New Jersey on 1203. Otherwise use the WLO Frequencies listed below.

WLO ITU CHANNELS

Channel Number	RX Frequency	TX Frequency
405	4369.0	4077.0
414	4396.0	4104.0
419	4411.0	4119.0
607	6519.0	6218.0
824	8788.0	8264.0

WLO ITU Channels continued on page 62

WLO ITU CHANNELS

Channel Number	RX Frequency	TX Frequency
829	8803.0	8279.0
830	8806.0	8282.0
1212	13110.0	12263.0
1225	13149.0	12302.0
1226	13152.0	12305.0
1607	17260.0	16378.0
1641	17362.0	1648.0
1647	17380.0	16498.0
2237	22804.0	22108.0

Contact Rene Stiegler of WLO radio for information and frequency information packs. PH:(334)665-5110, FX:(334)666-8339, or wloemail@aol.com or rene@shipcom.com

Try tuning these channels in now and listen to the ship-to-shore traffic. You will hear only the shore side of the conversation because the ships are transmitting duplex. Phone calls cost under \$5 a minute, with no land-line charges. There is a 3-minute minimum, so once you start gabbing, go for 3 minutes and make it a \$15 bill. If you get an answering machine, tell the operator to cancel the call, and you pay nothing. Radio checks with AT&T are free. Calling the Coast Guard through AT&T is also free. What? **Calling the Coast Guard through the high seas marine telephone service? Why?**

COAST GUARD CHANNELS

2182 kHz - Distress	424	Working, Weather, AMVER
Channel	601	Working, Weather, AMVER
Channel	816	Working, Weather, AMVER
Channel	1205	Working, Weather, AMVER
Channel	625	Working, Weather, AMVER

These are United States Coast Guard weather, AMVER, and working channels and are not necessarily monitored 24 hours a day for a distress call. These are the channels where you will hear automated Coast Guard weather. It is digital speech synthesized, and will sound like someone sitting on a fish hook.

If you need the Coast Guard anywhere in the world, call on the high seas marine operator duplex channels. I guarantee they are listening because they're looking to make money on an incoming phone call. They won't make money on a Coast Guard call because they'll patch you through free. But once your situation is stabilized, the Coast Guard will ask you to switch over to one of their working channels. Suggest a channel near the MHz band you are presently going through the marine operator on. Just look at your radio dial—if it's reading 1201, then you are on the 12 MHz band. You would suggest to the Coast Guard you can work them on ITU Channel 1205. Switch over, and you will hear their friendly voice.

Did You Know?

The Coast Guard tracks commercial shipping all over the world on a computer in New York—and if you need help or evacuation anywhere out on the sea they can probably find someone within 300 miles of you and request them to divert and lend assistance. This is part of the Coast Guard's AMVER program.

Ship-to-Ship

Here is where SSB radio manufacturers have split from the normal channeling scheme. Here are the channel designators that **SHOULD** come up on your marine SSB for ship to-ship safety and routine calls:

CHANNEL DESIGNATORS

CHANNEL	FREQUENCY	USE AND DESIGNATOR
4-0	4125 kHz	Safety, "4S"
4-1	4146 kHz	Ship-to-Ship, "4A"
4-2	4149 kHz	Ship-to-Ship, "4B"
4-3	4417 kHz	Ship-to-Ship, "4C"
6-0	6125 kHz	Safety, "6S"
6-1	6224 kHz	Ship-to-Ship, "6A"
6-2	6227 kHz	Ship-to-Ship, "6B"
6-3	6230 kHz	Ship-to-Ship, "6C"
6-4	6516 kHz	Ship-to-Ship, "6C"
8-0	8291 kHz	Safety, "8S"
8-1	8294 kHz	Ship-to-Ship, "8A"
8-2	8297 kHz	Ship-to-Ship, "8B"
12-0	12.290 kHz	Safety, "12S"
12-1	12.353 kHz	Ship-to-Ship, "12A"
12-2	12.356 kHz	Ship-to-Ship, "12B"
12-3	12.359 kHz	Ship-to-Ship, "12C"
12-4	12.362 kHz	Ship-to-Ship, "12C"
12-5	12.356 kHz	Ship-to-Ship, "12E"
16-0	16.420 kHz	Safety, "16S"
16-1	16.528 kHz	Ship-to-Ship, "16A"
16-2	16.528 kHz	Ship-to-Ship, "16B"
16-3	16.534 kHz	Ship-to-Ship, "16C"
22-8	22.159 kHz	Ship-to-Ship, "22A"
22-9	22.162 kHz	Ship-to-Ship, "22B"
22-0	22.165 kHz	Ship-to-Ship, "22C"
22-4	22.168 kHz	Ship-to-Ship, "22C"
22-5	22.171 kHz	Ship-to-Ship, "22E"

TIP!

Not all marine SSB transceivers list these ship-to-ship channels by the ITU duplex number. Most ICOM marine SSB transceivers list ship-to-ship simplex frequencies by the megahertz band, a hyphen, and numbers 1 through 9. Sometimes the number 1 and 2 correspond with ship-to-ship A and B channels, yet other times they number up from the safety channel so A now becomes "-2." But not to worry, just double check the frequency with the ship-to-ship channels and frequencies I have just listed, and go with the frequency.

The safety channels are restricted to navigation. Safety, and weather information, similar to what takes place on marine VHF channel 6. No gabbing on the marine SSB safety channels. The marine ship-to-ship channels may also be used by private coast stations so you can talk from ship to shore and bypass the marine operator. Towing and salvage companies, plus marine stores regularly conduct business on ship-to-ship channels 4A, 8A, and 12A. Now go back to the list and double check the frequencies:

4A = 4146 kHz

8A = 8294 kHz

12A = 12,353 kHz

Find these channels on your own SSB radio, and verify the channel number agreeing with the actual ship-to-ship/ship-private coast shore frequency.

If you're cruising, the Federal Communications Commission offers additional 4 MHz and 8 MHz channels for ship-to-ship communications. This will relieve all of the congestion now found on popular channels 4A, 4B, 8A and 8B. At last—"secret" ship-to-ship SSB frequencies that are perfectly legal under FCC Rule 80.374 (b) (c).

"SECRET" SHIP-TO-SHIP FREQUENCIES

4 MHz SHIP-TO-SHIP FREQUENCIES	8 MHz SHIP-TO-SHIP FREQUENCIES
4000	8101
4003	8104
4006	8107
4009	8110
4012	8116
4015	8119
4018	8122
4021	8125
4024	8131
4027	8134
4030	8137
4033	8140
4036	8143
4039	8146
4042	8149
4045	8152
4048	8155
4051	8158
4054	8161
4057	8164
	8157
	8170
	8173
	8176
	8179
	8182
	8185
	8188
	8191

The FCC Rules state, "These frequencies are shared with fixed services, and marine ship-to-ship operation must not cause harmful interference to those other services." In other words, if you and a cruising buddy land on a frequency and overhear shore traffic complaining about your ship-to-ship communications, switch off that channel in the table above.

Shore stations will continue to monitor their regular frequencies on 4 and 8 Alpha and Bravo frequencies, no charge. But mariners wishing to intercommunicate ship-to-ship on 4 MHz and 8 MHz may now switch to these new, very quiet SSB channels in full compliance with FCC rules. In fact, 4030 MHz is fast becoming the Baja "intercom" channel for mariners with SSB transceivers.

In the Caribbean to Panama canal, try 4054. Hams in the canal, listen 7083 to 7085 lower sideband.

WEATHER FACSIMILE CHANNELS	
ALL UPPER SIDEBAND:	
Pacific Coast	8680.1 kHz
Pacific Coast/Long-Range	12,728.1 kHz
Hawaii	11,088.1 kHz
Pacific/Hawaii	16,133.1 kHz
Hawaii	9980.6 kHz
New Gulf Frequencies	4316, 8502, 12,788 kHz
Boston	6340.5 kHz
Atlantic	10,863.2, 12,748.1, 8078.1, 15,957 kHz

TIP!

You might also memorize aeronautical East Coast and West Coast tower channels 13,282 and 13,270 kHz. I would also fill up one of those user-programmable memory channels with 13,300 and 5547 kHz, both upper sideband, aeronautical in-route frequencies. **If you can't raise the Coast Guard in an emergency, squawk Mayday to an airliner! It's been done before.**

FCC rules prohibit a marine radio being shared with another radio service. But if you are a voluntary equipped boat, you are not required by law to have a marine radio onboard—so one day you consider it a marine radio, and the next day you consider that marine radio a ham radio. Trust me. It works, but only if the marine radio has capabilities already unleashed as an amateur radio.

You could store the ham FREQUENCIES into any one of the 100 or more user-programmable marine channels on a modern ICOM marine SSB radio. A sample:

3968 kHz, lower sideband, West Coast marine nets
7268 kHz, lower sideband, East Coast waterway net
7238 & 7294 kHz, lower sideband, morning West Coast nets
14.300 kHz, upper sideband, 24-hour ham maritime mobile nets
14.340 kHz, upper sideband, West Coast 11 :00 a.m. mañana net
14,313 kHz, upper sideband, Pacific evening maritime net
21,402 kHz, upper sideband, Pacific and South Pacific

You need an amateur license to talk on these frequencies, but you don't need a license to listen and glean great weather information. In an emergency, you can holler for help on these frequencies without any questions asked. But it better be a real life-and-death emergency. You know how hams are. I'm one of them, too!

Finally, your SSB transceiver can be put into the AM double sideband mode, and the time signals and shortwave broadcast frequencies memorized to get up-to-date weather information the correct time, and the latest news from BBC and Voice of America.

5, 10, 15 and 20 MHz time signals
5975 kHz AM shortwave
7435 kHz AM shortwave
9575 kHz AM shortwave
11, 835 kHz AM shortwave
13,760 kHz AM shortwave
15,120 kHz AM shortwave

Tune anywhere around these AM shortwave frequencies for plenty of foreign and USA broadcasts.

Your best radio check is with the high seas marine operator. You must call them for a minimum of 45 seconds in order for them to beam you in with their massive antenna systems. A quick call will lead to no contact. Make it a long call, giving your vessel name, official FCC call sign or ship registration number, your position, the ITU channel you are communicating over, and repeat the process over and over and over and over again for 45 total seconds. Close talk the mic—push the plastic right up against your lips. If you talk 6 inches away from the mic, your power output will be zilch. SSB mic are all noise canceling, and you must absolutely touch the mic to your lips to get a signal out on the airwaves.

As you talk, you may notice your panel lights blinking, your anemometer exceeding 100 knots, your electric head going into the masticate mode, and various other pieces of marine electronics including autopilots going nuts on transmit. This is perfectly normal. It means you're putting out one walloping signal. You must live with it. There is no simple cure.

TIP!

Your radio check to the marine operator should finally achieve success on one of their working channels. If one megahertz band doesn't work, dial in another marine operator in another part of the country, and give THEM a try. Or tail in at the end of another ship contact when the marine operator is ready to sign off. If you can hear the marine operator well, they should pick you up as well.

One of the best radio checks is from the technician that installed the marine SSB. Don't let them off the ship until they reach a marine operator at least 1,000 miles away and get a good radio check on the air. Accept no excuses. I have seen marine SSB installations that LOOK good on a wattmeter, but over the air SOUND bad. An improperly installed automatic antenna tuner cable rectifies the RF wave and brings it back into the radio, scrambling your audio to sound like you are talking underwater. You can't see it on a meter, but you'll sure know you have this problem if absolutely nobody comes back to your request for radio checks.

With more and more radiotelephone calls going satellite aboard ships, be assured that the high seas marine SSB radiotelephone service is looking for more activity out there on the airwaves, and the technicians are eager to get you into their computers and will regularly run radio checks with you to give you the confidence of knowing they can reach out almost anywhere to take your incoming or outgoing phone call. Radio checks are free.

Did You Know?

The marine SSB radio manufacturers are delivering equipment designed more for the radio guru than the active sailor with things on the mind other than is 451 really 4-1 or is it really 4-alpha? ICOM's M710 marine SSB has the capability of programming the screen to read out the channel function in addition to just the channel number and frequency. Great idea.

A marine SSB is a powerful communications device for worldwide cruising and sailing. Know its capabilities, and know what the channels can do for you. There is absolutely nowhere in the world that you could cruise that you couldn't get back to a shore-side station on marine SSB on one of the megahertz bands. EVERYWHERE there are domestic and foreign shore-side stations ready to take your duplex channel activity. The modern marine SSB has all of these channels in memory. Now you know where to go to make that ship-to-ship, ship-to-shore, or emergency distress call.