

Installation Considerations

Music is a vital part of boating pleasure for many people. But obtaining high-quality music on a boat is sometimes difficult. For optimum sound, you need more than just a good stereo, you need high quality marine speakers that are properly installed. Follow these principles to ensure the best quality sound on your boat, and to save yourself future repair and replacement work.

Flush Mount or Box Speakers?

Speakers that require a cutout (flush mount) and speakers that don't. Box speakers have the obvious advantage that they don't require you to cut a hole in your boat. But they take up more space than flush mount speakers and can be cumbersome in a busy cockpit.

Box speakers typically are installed in an acoustically-designed enclosure around the driver to provide a structured resonance space for optimum performance. They are easy to install and you can feel comfortable that the sound you heard in the showroom will be similar to the sound you hear on your boat.

You might choose flush mount speakers because they are attractive, can be installed in tight spaces and out of the way on most activity. However, proper mounting can be tricky. Speakers work by moving a diaphragm (cone) back and forth to move air and generate sound. An air space that is too small will inhibit movement of the diaphragm and result in a serious loss of low frequency response. Also, make certain there is no air path between the front and rear of the speaker. When the diaphragm moves forward, air will rush into the vacuum behind the speaker instead of traveling to your ear, again resulting in loss of low frequency response.

Waterproof Speakers a Must

Home or automobile speakers have steel frames and grilles, exposed copper wires and, in some cases, paper cones. All of these features are a problem on a boat: steel rusts, copper corrodes, and paper dissolves. Since salt air is the main environmental problem, waterproof speakers should be used below decks as well as in the cockpit.

Installation

Speakers are directional. When installing speakers on deck, be careful to point them toward the place your ears will be. Below deck, direction is less crucial, since there are many reflective surfaces to contain the sound.

We recommend using 18-gauge wire when connecting the system. Tinned marine wire is best, although doorbell wire works well. It is inexpensive, comes in pairs, and isn't stranded, so there is less surface area to corrode. Since copper wire is very vulnerable to corrosion, you should seal all wires between the insulation and soldered area. Liquid electrical tape is excellent for this application.

Make sure positive terminals on speakers are matched with the positive side of the stereo output; i.e., they are connected "in phase." Speakers that are "out of phase" because some connecting wires are reversed will result in some tones canceling each other out and an audible reduction in sound quality.

Speakers connections out of phase will not physically harm the stereo or the speakers. If you are not sure which speaker terminal is positive, place a AA or AAA battery across the terminals. When the positive terminal of the battery touches the positive terminal of the speaker, the speaker cone will move forward.

Placement

Until now, installing speakers within 5 feet of compasses, autopilots or other navigation gear was a problem. The magnetic flux produced by an operating speaker could affect compass readings and any other equipment interfaced with the compass. Now, with poly-planar®'s exclusive new ultra-low magnetic field speakers, maintaining the 5 foot distance is no longer necessary. The low magnetic field technology uses a canceling magnet and a shielded enclosure to reduce the magnetic flux caused by the speaker. Ultra-low magnetic field speakers in poly-planar®'s line include all of the 4000 Series Round Integral Grille (MA4054, 4055, 4056 and 4600) and the MA5500 rectangular flush mount models, an ideal upgrade for the MA505 popular with many boaters worldwide.

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Speakers are directional: Point them at your ears. A speaker produces the best sound along its central axis. Sound radiates in a pattern approximately 45 degrees off the main axis. If you are not in this radiating zone, the sound must bounce off a reflecting surface in order to be heard. Below deck, this is usually not a problem, as space is typically quite small and there are plenty of reflecting surfaces. However, above deck, reflecting surfaces are limited. When mounting speakers, try to imagine where your ears will be located when listening, and try to point the speakers toward your ears. Location affects both the volume and the quality of the sound you hear, since different frequencies disburse with different efficiencies.

Flush-mount speakers need air behind them. Don't choke your sound. In general, more air is better. If you have less than one cubic foot of air behind your speakers, you are at risk of inhibiting the bass response. Sound is a

compression wave which is created when the speaker cone moves in and out. If the air cavity behind the speaker is too small, cone movement is inhibited by the vacuum created in the cavity when the cone moves outward. Likewise, pressure is created when the cone moves inward, which also slows cone movement. The result is a loss of bass response, since low frequencies require the largest air movement.

Separate the air in the front of the speaker from the air behind it. Don't use your speaker in "free air". As a speaker cone moves forward, it creates positive air pressure in front of the cone, which eventually reaches your eardrums and enables you to hear the sound. At the same time, the forward movement of the cone also creates a vacuum behind the cone. If there is no baffle (wall) separating the front of the speaker from the back of the speaker, the positive air pressure at the front of the cone will rush around the edge of the speaker and fill in the vacuum behind the cone. This positive pressure will not reach your ear, which has the effect of dramatically reducing bass response. This condition, known as "free air response", is the reason why unmounted speakers may lack bass response and sound "tinny." Your speakers should be able to handle more power than your stereo can produce, so you don't blow your speakers. A speaker's power handling specification is a measure of the point at which the speaker will fail if more than the specified power is applied. On a stereo, the power specification is the maximum amount of power the stereo will produce. If the stereo can produce more power than the speakers can handle, you run the risk of blowing out your speakers at high volume. If you have a high power stereo and low power speakers, a useful precaution is to wire an in-line fuse to one side of each speaker line. [To calculate the size of the fuse, divide the speaker's RMS watts by four. The square root of that quotient equals the size of the fuse required.] Power ratings can be confusing because power can be specified in several ways, all of which are expressed in watts. See Power-in the Glossary for more information. Use RMS power for comparison purposes whenever possible. Be sure to compare the per channel power of the stereo with the per speaker power of the speakers. Note that when two or more speakers are connected to the same channel of the stereo, the speakers will share the power - two 20 watt speakers will handle a total of 40 watts, three 20 watt speakers will handle 60 watts, etc. You do not gain low power sound quality by increasing the maximum power handling of your speakers. A one-watt signal will not sound any better played on 100 watt speakers than it will on 10 watt speakers. The most critical factor affecting sound quality is the size of the main cone: the larger the cone, the better the bass response.