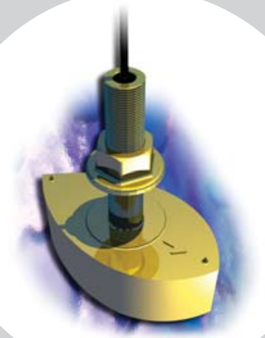
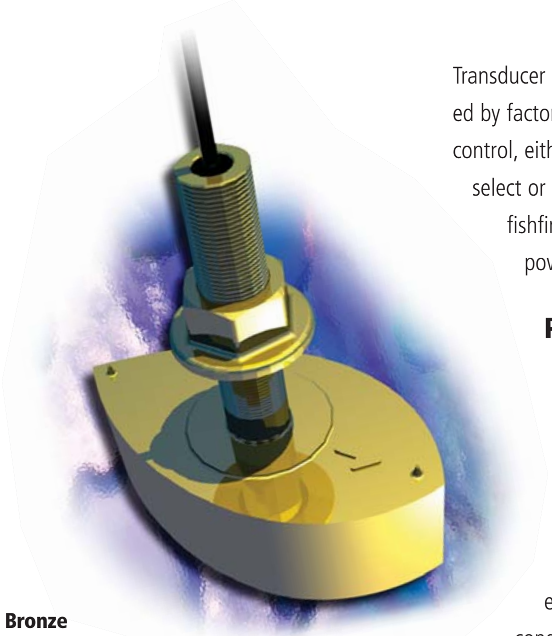
Raymarine

Transducer Selection Guide

Transducers for the hsb² and
SL Series Echo Sounders





Bronze Depth Transducer

Selecting the Right Depth Transducer

Installing the right depth transducer is vital to getting the most out of your fishfinder. Raymarine offers a range of transducers designed for a variety of vessel types and performance requirements. This document was designed to help you decide which depth transducer is best for you.

Factors Affecting Performance

Transducer performance is affected by the environment in which the transducer is operating. Sound waves, particularly at higher frequencies, are reflected and absorbed by the salt and other minerals and by plankton, algae and other plant life suspended in the water. Near the surface, waves and currents create air bubbles that also adversely affect the signal. In fact, sound waves can almost be totally reflected on the surface at the layer between water and air. For this reason, it is important that the transducer is mounted where it will remain free of bubbles.

Transducer performance can also be affected by factors over which you have some control, either by the type of transducer you select or by adjustments you make on the fishfinder. Three of these factors are power, frequency and cone angle.

Power

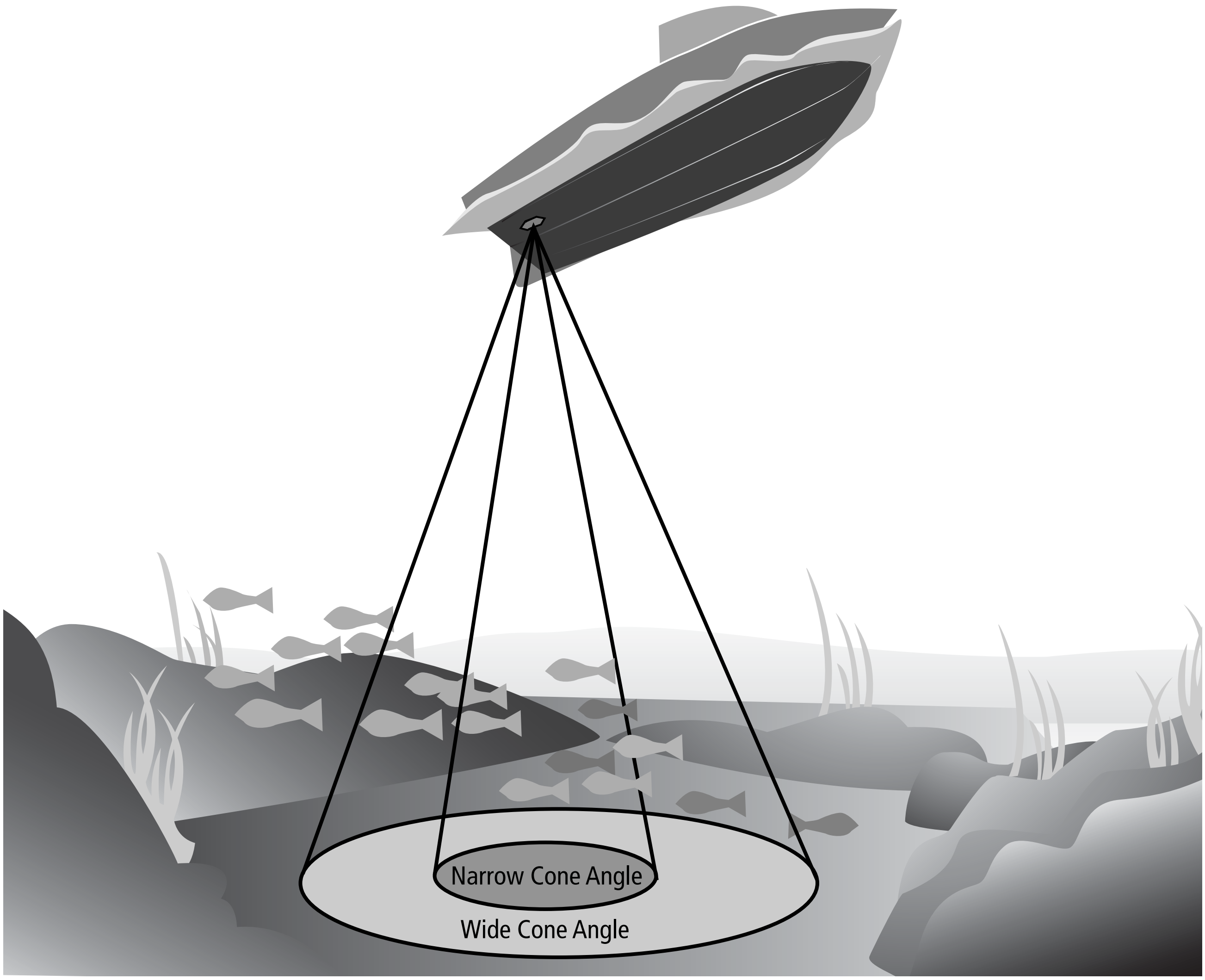
Power refers to the strength with which the transducer sends the sonar "ping", expressed as watts RMS. Higher power increases your chances of getting a return echo in deep water or poor water conditions. It also lets you see better detail, such as bait fish and structure. Generally, the more power you have, the deeper you can reach and the easier it is to separate echoes returning from fish and bottom structure from all the other noises the transducer detects.

Frequency

The accuracy with which your fishfinder detects bottom and other objects is also determined by the frequency selected for the depth you are viewing. Raymarine depth transducers can be tuned to two different frequencies: 50 kHz (low) or 200 kHz (high).

200 kHz works best in water under 200 feet/60 meters and when you need to get an accurate reading while moving at faster speeds. High frequencies give you greater detail to detect very small objects but over a smaller portion of water. High frequencies typically show less noise and fewer undesired echoes while showing better target definition.

For deep water, 50 kHz is preferred. This is because water absorbs sound waves at a slower rate for low frequencies and the signal can travel farther before becoming too weak to use. The beam angle is wider at low frequencies, meaning the outgoing pulse is spread out more and is better suited for viewing a larger area under the boat. However, this also means less target definition and separation and increased susceptibility to noise. Although low frequencies can see deeper, they may not give you a clear picture of the bottom.



Low frequencies have wider beam angles than high frequencies

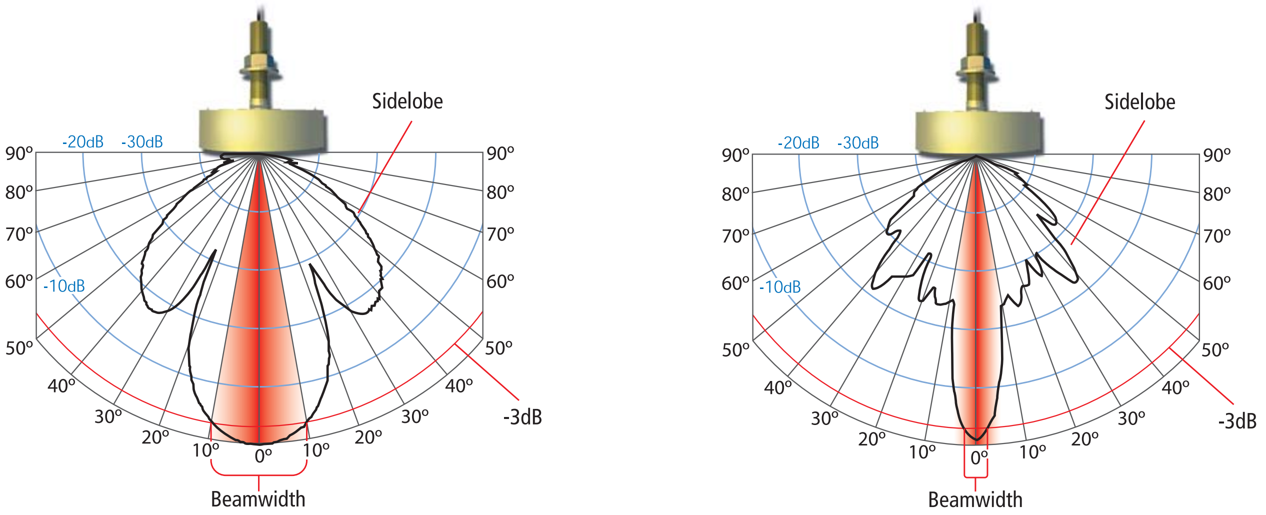
A rule of thumb would be to use the 200 kHz setting for a detailed view to about 200 feet and then switch to 50 kHz when you want to look deeper. Better yet, display both views side-by-side on a split screen for both perspectives. The illustrations at the end of this document demonstrate the difference in performance between the two frequencies.

Cone Angle

The transducer concentrates the transmitted sound into a beam. In theory, the emitted pulse radiates out like a cone, widening as it travels deeper. In reality, beam shapes vary with the transducer type and typically exhibit "side lobe" patterns. The following figures give a graphic representation of the transducer's actual transmit radiation patterns.

For the scope of this discussion, however, the idea of a cone works just fine. The signal is strongest along the centerline of the cone and gradually diminishes as you move away from the center. Wider angles offer a larger view of the bottom, yet sacrifice resolution, since it spreads out the transmitter's power. The narrower cone concentrates the transmitter's power into a smaller viewable area. Cone angles are wider at low frequencies and narrower at high frequencies.

To sum up, a wide cone angle can detect fish around the boat and not just those directly under it while exhibiting less target separation. A narrow cone concentrates the sound output enabling it to better detect small details, such as fish or bottom structure, but only scans a small amount of water at a time.



Sample Transducer Transmit Patterns

Factors in Selecting a Transducer

When trying to determine which transducer is best for you, you'll need to consider the following variables:

- What material the transducer housing is made of, based on boat hull composition
- How the transducer should be mounted on the boat: in the hull, through the hull, or on the transom
- What you want to see displayed: depth, speed, temperature, or a combination

Following this section is a table with guidelines for selecting the proper transducer based on these factors, and then graphic illustrations of what you can expect to see from four sample transducers at various depths.

Composition

The first step is to determine what material the transducer should be composed of.

Plastic housings are recommended for fiberglass or metal hulls.

Bronze housings are recommended for fiberglass or wood hulls. Bronze is preferable to plastic for wooden hulls because the expansion of wood could damage a plastic transducer and cause a leak. Installation of a bronze housing in a metal hull requires an insulating fairing, available from your Raymarine dealer. A metal housing should NOT be installed in a vessel with a positive ground system.

Stainless Steel housings are recommended for steel or aluminum hulls.

Mounting Methods

Once you have an idea of what material the transducer should be made of, next determine how it it will be mounted to the boat.

In-Hull Transducer

In-hull (a.k.a. shoot-through) transducers are epoxied directly to the inside of the hull. These are only used in fiberglass hulls. In-hulls will not work with wooden aluminum, wood, or steel hulls, or in foam sandwich or hulls that have air pockets. Any wood, metal, or foam reinforcement must be removed from the inside of the hull.

With an in-hull transducer, the signal is transmitted and received through the hull of the boat. As a result, there is considerable loss of sonar performance.

In other words, you won't be able to read as deep or detect fish as well with an in-hull transducer as with one that's transom mounted or thru-hull mounted.

Fiberglass hulls are often reinforced in places for added strength. These cored areas contain balsa wood or structural foam, which are poor sound conductors. The transducer will need to be located where the fiberglass is solid and there are no air bubbles trapped in the fiberglass resin. You'll also want to make sure that there is no coring, flotation material, or dead air space sandwiched between the inside skin and the outer skin of the hull.

Advantages

- Inexpensive type
- No holes drilled in hull
- No obstructions in the water
- Low maintenance

Disadvantages

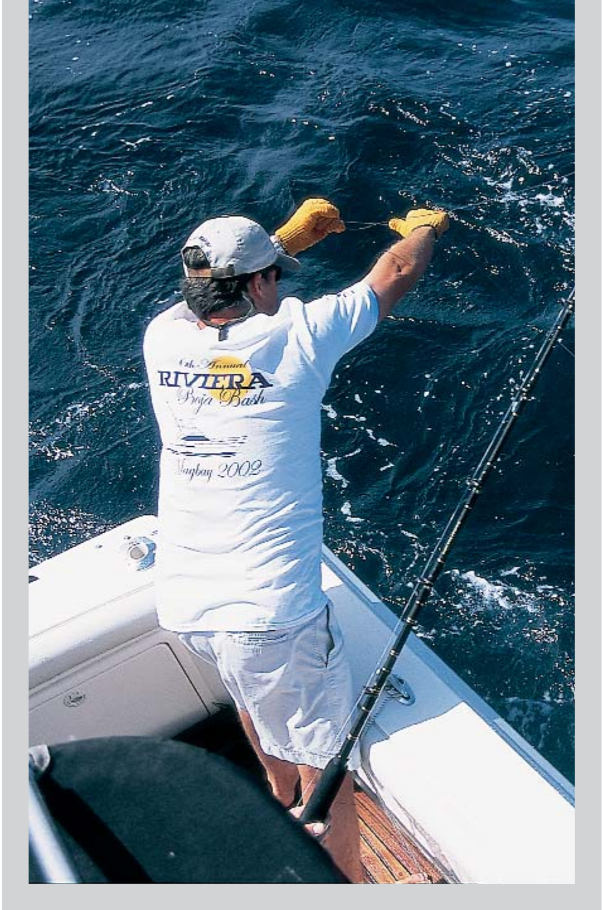
- Reduced maximum depth reading
- Poorer fish detection
- Can only be used with fiberglass hulls

Transom Mount Transducer

As the name implies, transom mount transducers are installed on the boat's transom, directly in the water and typically sticking a little below the hull. Transom mounts are composed of plastic and tend to be less expensive than other transducers.

Transom mount transducers are recommended for planing hulls of less than 27 feet (8 meters), such as personal watercraft and powerboats with outboard, inboard-outboard and jet drives. They are not recommended for large or twin screw inboard boats because aerated water from the propeller reduces performance. They are also not recommended for operation at very high speeds.

Transom Mount Transducer



Transom mounts adjust to transform angles from 3˚-16˚. For angles greater than 16˚, a tapered plastic, wood or metal shim will be needed. However, the transducer should be adjusted so it is angled slightly forward when the boat is in the water.

Advantages

- Easy to install
- Easy to clean
- Inexpensive

Disadvantages

- Performance not as good as thru-hull
- Typically used with smaller vessels

Thru-Hull Transducer

Thru-hull transducers are mounted through a hole drilled in the bottom of the boat and protrude directly into the water. This type of transducer generally provides the best performance and tends to be the most expensive.

Thru-hulls are recommended for displacement hulls and boats with straight-shaft inboard engines.

Thru-hull transducers must be positioned in front of the propeller, rudder, keel or anything else that may create turbulence. They must be mounted in a position that is always underwater and angled straight down.

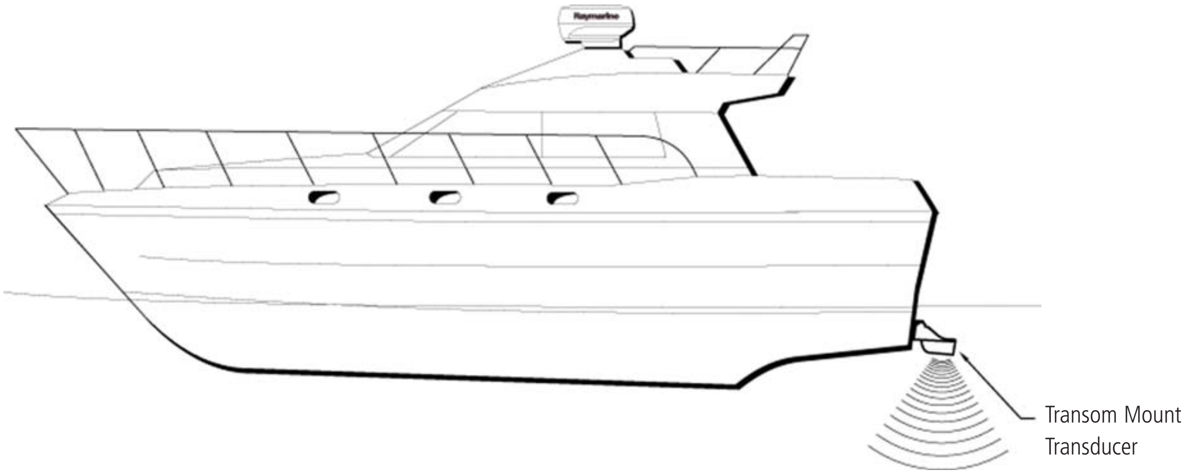
Thru-hulls also require the use of a fairing block for proper mounting to the hull. Refer to the table on the following page.

Advantages

- Best performance
- Can be operated at faster speeds

Disadvantages

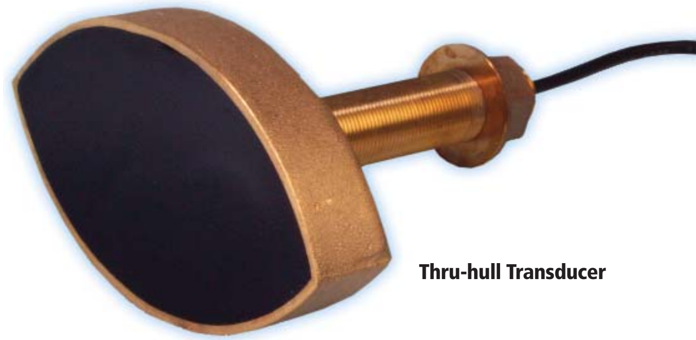
- Requires hole drilled in hull
- Requires fairing block
- More maintenance- more susceptible to fouling or marine growth



Fairing Blocks for Thru-hull Transducers

Thru-hull transducers must be installed with a fairing block to ensure proper alignment and a secure fit. If you select one of the following thru-hull transducers, you'll need to install it with the corresponding fairing.

Transducer Part Number	Model Number	Fairing Part Number
E66020	B744V	E66023
E66024	B256	E66025
E66029	B744VL	E66023
E66033	B260	E66034
E66035	B45	E26017
E66043	SS544V	E66045



Thru-hull Transducer

Fairing for Thru-hull Transducer

Transducer Selection

Use the tables on the following pages to help you choose the transducer that's best for you. Locate the material your boat's hull is composed of, and then select the appropriate transducer mounting method and composition. Decide whether you want the transducer to also measure temperature and/or boat speed. If your fishfinder supports it, decide whether a high performance transducer (featuring higher power and a narrower cone angle) is desirable for better viewing at deeper depths.

Remember that thru-hull transducers should be installed with a fairing block to ensure proper alignment and a secure fit.

SELECTION TABLE

Hull Type	Mounting Method	Material	Type	Max. Power	Cone Angle [1]
FIBERGLASS	In-Hull	Plastic	Depth	600 W	45°/11°
	Transom	Plastic	Depth, Speed, Temp	600 W	45°/11°
	Thru-Hull	Plastic	Depth	600 W	45°/15°
		Bronze	Depth	600 W	45°/15°
				600 W	45°/12°
			Depth, Temp	600 W/1000W	14 & 23/3 & 5 [3]
				600 W/1000W	19°/6°
			Depth, Speed, Temp	600 W	45°/12°
				600 W	45°/12°

+ Advantages/ – Disadvantages	Part no. (model)	Hull Type
+ High speed; no drilling required – Poorer performance	E66008 (P79)	
+ Depth, speed, and temperature – Slower speeds	E66038 (P66)	
+ Low profile – No speed or temperature	E66013 (P319)	
+ Low profile – No speed or temperature	E66014 (B117)	
+ Smaller install hole than E66014 – No speed or temperature	E66035[2] (B45)	
+ High power for deep water use; Low cone angle for better detail – 1000W only with certain fishfinders	E66024[2] (B256)	
+ High power, low cone angle; Low ringing = best resolution – 1000W only with certain fishfinders	E66033[2] (B260)	
+ Depth, speed, and temperature – Requires high speed fairing	E66020[2] (B744V)	
+ Depth, speed, & temp; long stem – Requires high speed fairing	E66029[2] (B744VL)	

FIBERGLASS

[1] Measured in degrees at frequencies of 50kHz/200kHz • [2] Requires a fairing for installation. See table on page 7 • [3] Measured from fore-to-aft and port-to-starboard

SELECTION TABLE

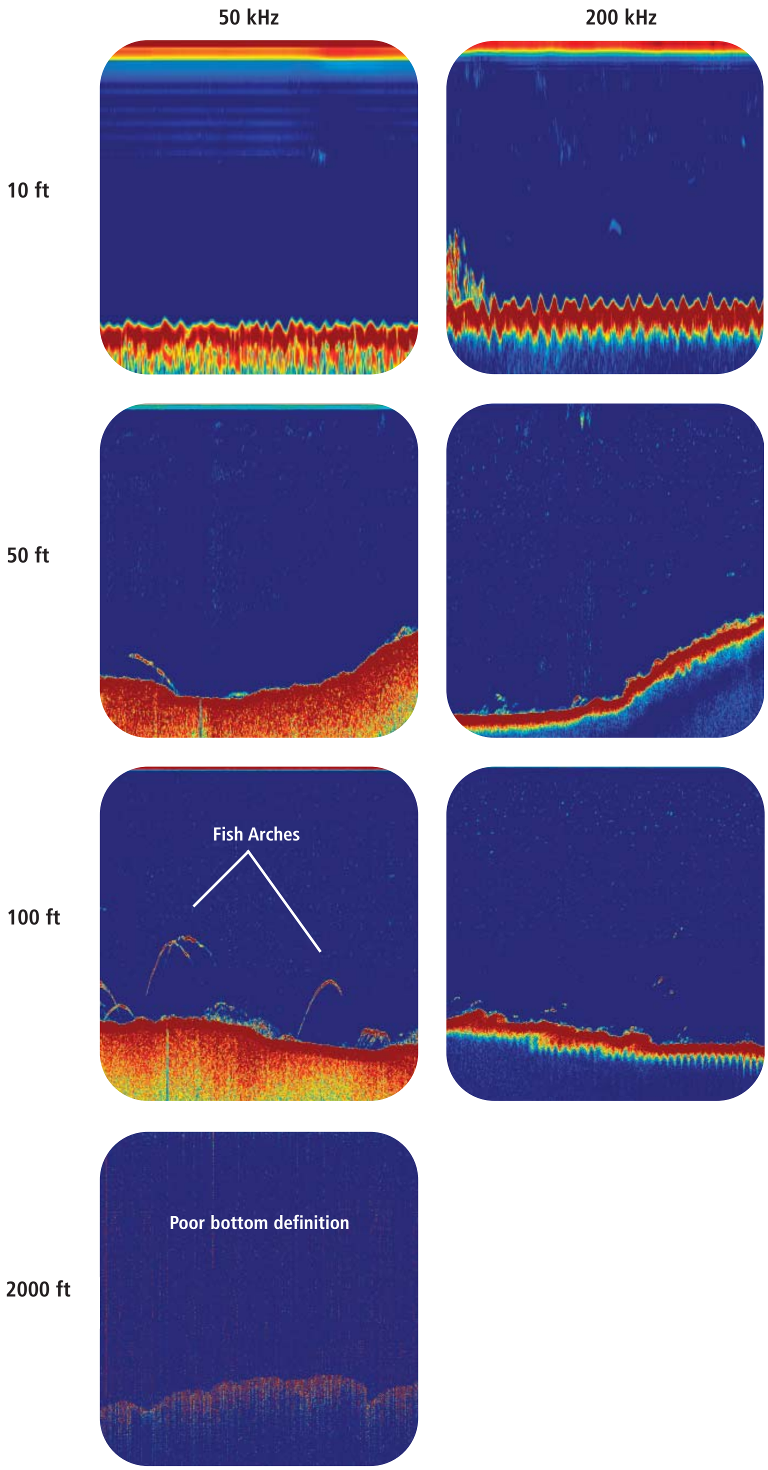
Hull Type	Mounting Method	Material	Type	Max. Power	Cone Angle [1]
METAL	Transom	Plastic	Depth, Speed, Temp	600 W	45°/11°
	Thru-Hull	Plastic	Depth	600 W	45°/15°
		Stainless Steel	Depth	600 W	45°/15°
			Depth, Speed, Temp	600 W	45°/12°
WOOD	Transom	Plastic	Depth, Speed, Temp	600 W	45°/11°
	Thru-Hull	Bronze	Depth	600 W	45°/15°
				600 W	45°/12°
			Depth, Temp	600 W/1000W	14 & 23/3 & 5 [3]
				600 W/1000W	19°/6°
			Depth, Speed, Temp	600 W	45°/12°
				600 W	45°/12°

+ Advantages/ – Disadvantages	Part no. (model)		Hull Type
+ Depth, speed, and temperature – Slower speeds	E66038 (P66)		METAL
+ Low profile – No speed or temperature	E66013 (P319)		
+ Low profile – No speed or temperature	E66015 (SS555V)		
+ Depth, speed, and temperature – Requires high speed fairing	E66043[2] (SS544V)		
+ Depth, speed, and temperature – Slower speeds	E66038 (P66)		WOOD
+ Low profile – No speed or temperature	E66014 (B117)		
+ Smaller install hole than E66014 – No speed or temperature	E66035[2] (B45)		
+ High power for deep water use; Low cone angle for better detail – 1000W only with certain fishfinders	E66024[2] (B256)		
+ High power, low cone angle; Low ringing = best resolution – 1000W only with certain fishfinders	E66033[2] (B260)		
+ Depth, speed, and temperature – Requires high speed fairing	E66020[2] (B744V)		
+ Depth, speed, and temp; long stem – Requires high speed fairing	E66029[2] (B744VL)		

[1] Measured in degrees at frequencies of 50kHz/200kHz • [2] Requires a fairing for installation. See table on page 7 • [3] Measured from fore-to aft and port-to-starboard

Performance Illustrations

Transom Mount Transducer E66038 (P66)



Use the pictures as a general guide for the performance of the various transducer types. They provide a good comparison of the transom mount, thru-hull and high performance thru hull units. Your actual performance will depend on the water conditions and type of fishfinder unit you are using.

Mud, soft sand, and plant life on the bottom absorb and scatter sound waves, resulting in a thicker bottom image. Rock, coral and hard sand reflect the signal easily and display thinner. This is easier to see using the 50 kHz setting, where the bottom returns are wider.

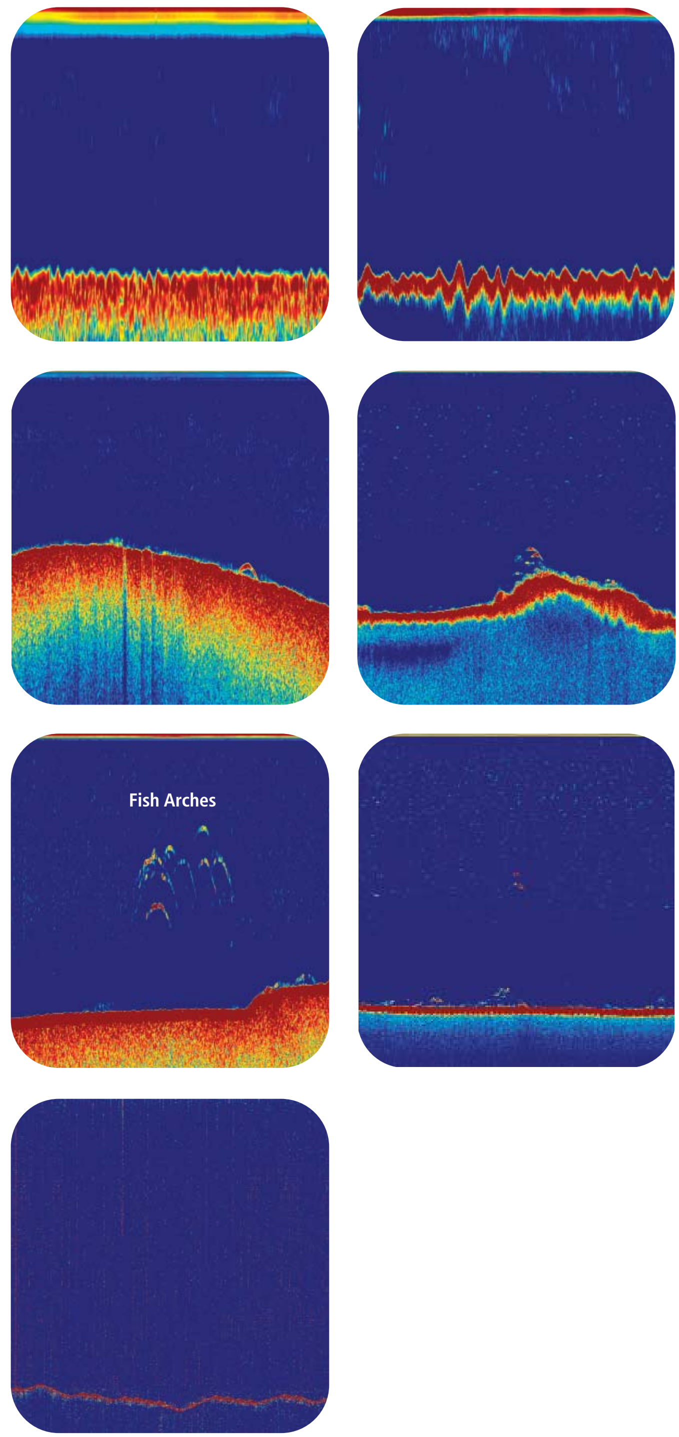
The images on the following pages illustrate sample fishfinder performance using four different transducers. Separate illustrations were generated for each transducer tested at depths of 10, 50, 100 and 2000 feet using both 50 kHz and 200 kHz frequencies. The pictures represent actual data collected from a moving vessel, which explains why the target objects and bottom structure in the images vary.

Performance Illustrations
Bronze Thru-Hull E66020 (B744V)

Generally, a thru-hull transducer will out-perform a transom mount. In shallower water, the 200 kHz frequency will perform better than 50 kHz, which is better at the deeper depths. In shallower water, you'll notice definition of the bottom and objects in the water tends to be better with 200 kHz, although a smaller area is displayed at one time.

Note the fish arches using 50 kHz.

50 kHz | 200 kHz



10 ft

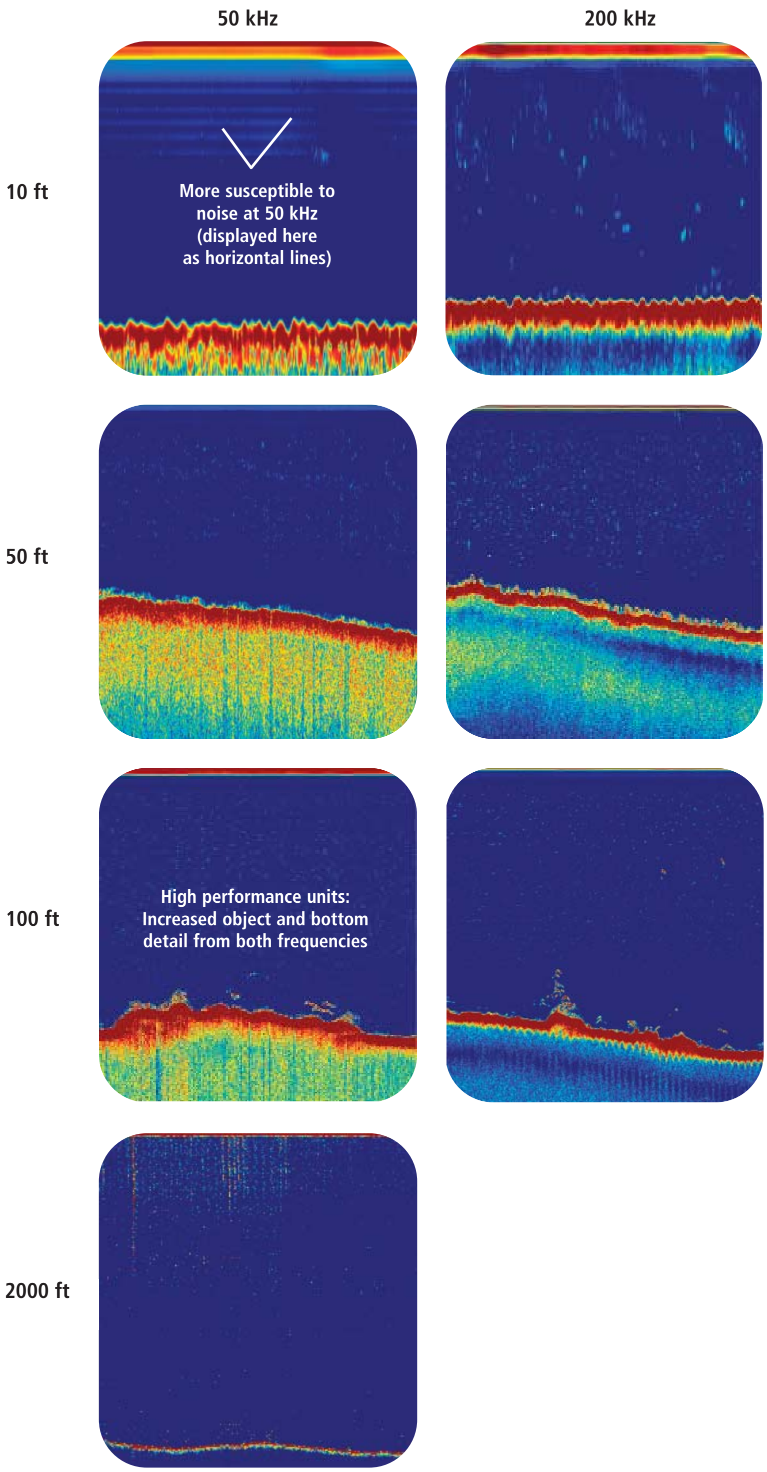
50 ft

100 ft

2000 ft

Performance Illustrations

High Performance Bronze Thru-Hull E66024 (B256)



In shallower water, you can see well-defined images using 200 kHz even with the lower end transducers. The 50 kHz setting is more susceptible to false echoes. Note the noise (horizontal lines) using 50 kHz at 10 feet.

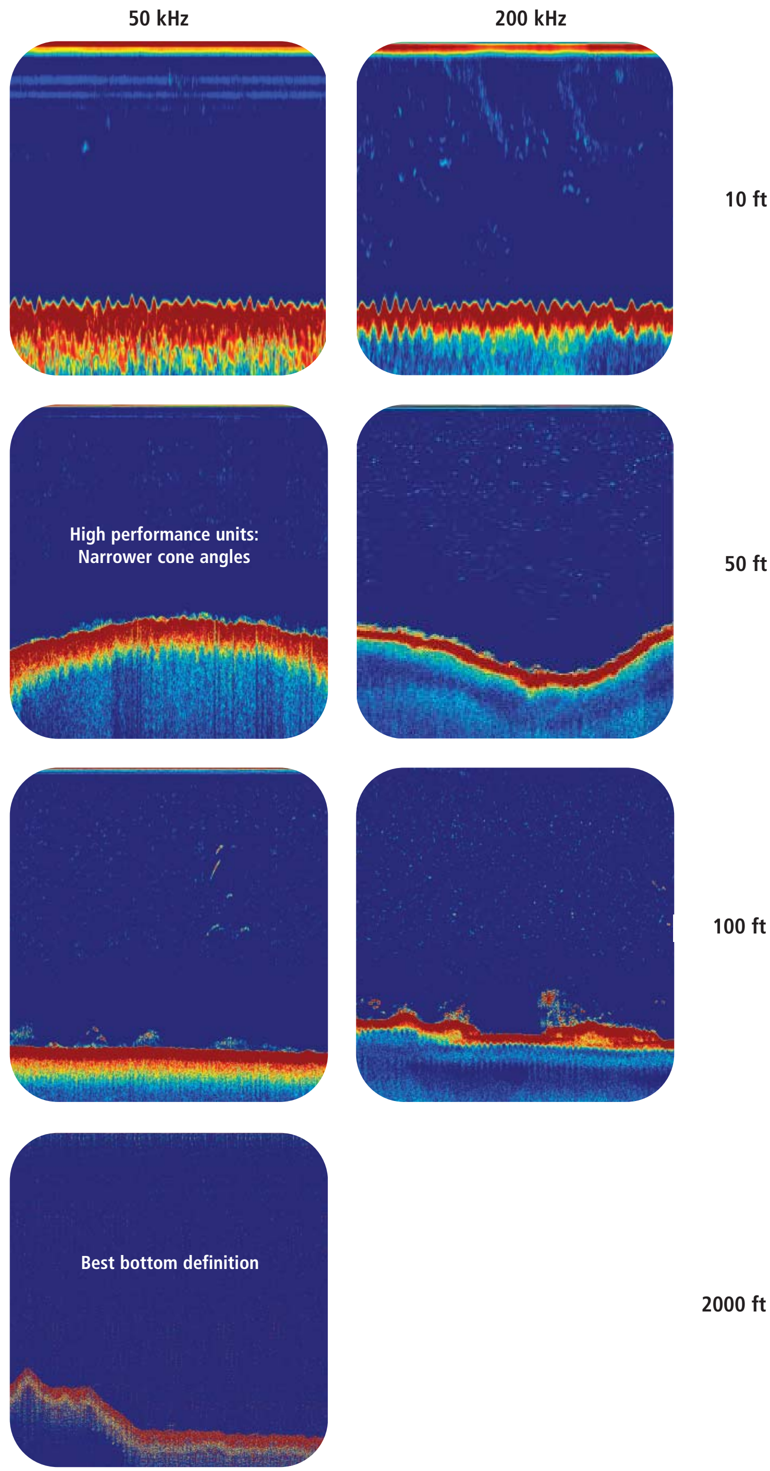
At 100 feet, the differences between the frequencies aren't as noticeable.

Details near the bottom improve at both frequencies using the high performance transducers.

The images on the following pages illustrate sample fishfinder performance using four different transducers. Separate illustrations were generated for each transducer tested at depths of 10, 50, 100 and 2000 feet using both 50 kHz and 200 kHz frequencies. The pictures represent actual data collected from a moving vessel, which explains why the target objects and bottom structure in the images vary.

By the time we get to 2000 feet, however, images can only be made with 50 kHz – 200 kHz can't travel that deep. You can clearly see superior returns using the high performance transducers.

From these illustrations, we can draw some generalizations about the various transducer types. Thru-hull transducers provide better performance, on the whole. In shallower waters, transom mounts will perform quite well. However, for extremely deep water, you should use the high performance thru-hulls.



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