

# OWNER'S GUIDE &

# INSTALLATION INSTRUCTIONS

In-Hull, 2-3kW

Transducer

Models: R199, R299, R399  
R111LH, R111LM, R599LH, R599LM

U.S. Patent No. 7,369,458. UK Patent No. 2 414 077. U.S. Patent Pending

01/12/13  
17-467-01 rev.06

**Follow the precautions below for optimal product performance and to reduce the risk of property damage, personal injury, and/or death.**

**WARNING:** Always wear safety goggles and a dust mask when installing.

**CAUTION:** The fiberglass hull below the transducer must be solid. The transducer will not transmit through coring material such as foam or balsa wood.

**CAUTION: CHIRP transducer**—Do not install in the engine compartment or other hot place. The transducer may fail if the temperature of the liquid in the tank exceeds 60° C (140° F).

**CAUTION: CHIRP transducer**—Always operate the transducer in liquid. Operating in air will allow the transducer to overheat resulting in failure.

**CAUTION:** Never pull, carry, or hold the transducer by the cable. This may sever internal connections.

**CAUTION:** Never use solvents. Cleaners, fuel, sealant, paint, and other products may contain solvents that can damage plastic parts, especially the transducer's face.

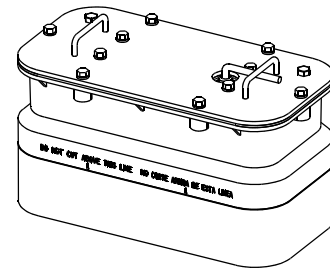
**IMPORTANT:** Please read the instructions completely before proceeding with the installation. These instructions supersede any other instructions in your instrument manual if they differ.

## Tools & Materials

- Safety goggles
  - Dust mask
  - Torque wrench
  - Rope
  - Detergent (some installations)
  - Weak solvent (such as alcohol)
  - Disk sander (some installations)
  - Thin sealable plastic bag (some installations)
  - Cable ties (some installations)
  - Water-based lubricant (such as K-Y® jelly) (some installations)
  - Carpenter's level
  - Pencil
  - Saw
  - Scissors
  - Sand paper: 80 grit
- Bonding material** (see [www.airmar.com](http://www.airmar.com) for additional brands):
- Fiberglass resin: Bondo 401  
West Marine #1937762
  - or Marine-Tex epoxy putty (14 oz. pack)
  - or 3M™ Marine Adhesive/Sealant 5200
- Propylene glycol** (non-toxic anti-freeze/coolant)
- Funnel
  - Grommet(s) (some installations)

Record the information found on the cable tag for future reference.

Part No. \_\_\_\_\_ Date \_\_\_\_\_ Frequency \_\_\_\_\_ kHz



## Applications

- Fiberglass hulls only
- Recommended for high-speed boats
- Accommodates a deadrise angle up to: (see Figure 1)
  - 12° on the long side of the tank
  - 22° on the short side of the tank
- Operates at *tank fill-liquid* temperatures up to 60° C (140° F)

## Assembling the Transducer

- Remove the paper backing from the adhesive side of the gasket. With the adhesive side facing the plate, align the holes and edges of the gasket with the under side of the plate (see Figure 2). Press the gasket firmly into place.
- Thread the cable through the cable hole in the gasket and plate.
- Rest the plate on the transducer with the gasket side down and align the mounting holes. Fasten the plate to the transducer. Use four of the hex-head bolts and lock washers supplied. Tighten using a torque wrench with a force not exceeding 85 in-lb. **Do not over tighten the bolts.**
- Thread the cable under the handle as seen in the drawing above.

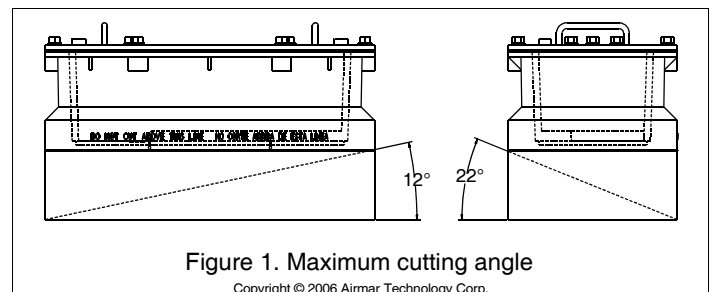


Figure 1. Maximum cutting angle

Copyright © 2006 Airmar Technology Corp.

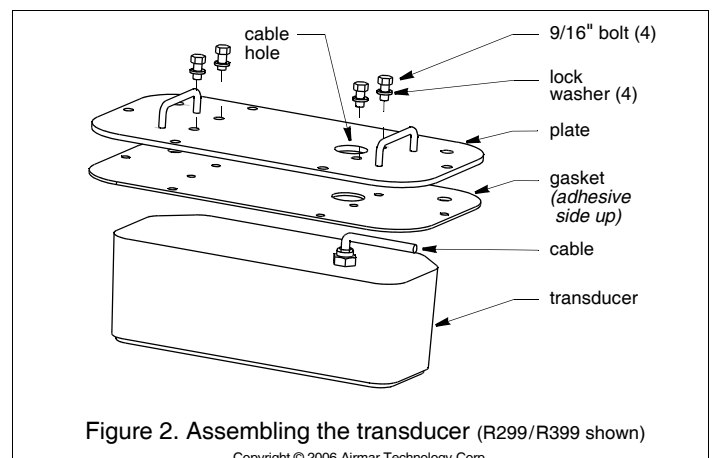
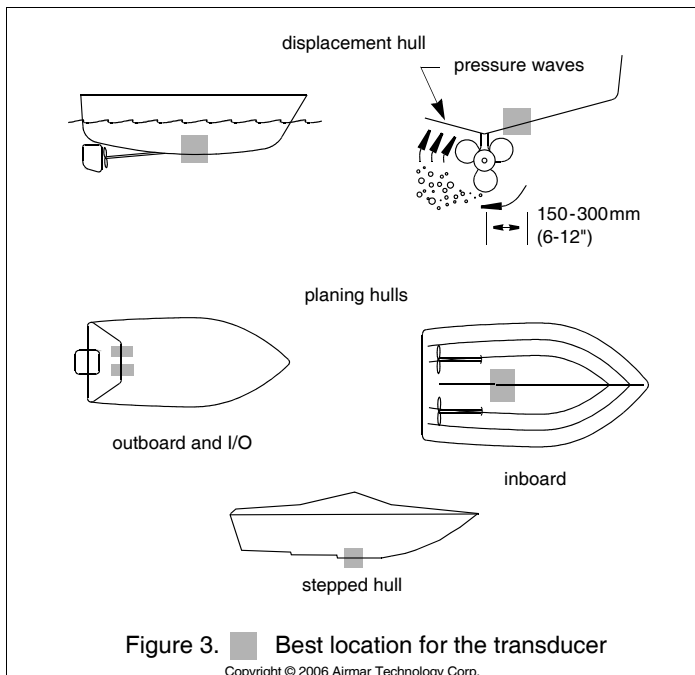


Figure 2. Assembling the transducer (R299/R399 shown)

Copyright © 2006 Airmar Technology Corp.



## Mounting Location

### About Fiberglass Hulls

Since the hull absorbs acoustic energy, transmitting through the hull reduces the transducer's performance. Fiberglass hulls are often cored in places for added strength or to reduce weight. These cored areas contain balsa wood or structural foam which are poor sound conductors. **Do not locate the transducer over coring.**

### Choose a Location

- Where the fiberglass is solid (no air bubbles are trapped in the fiberglass resin) and where no coring, flotation material, or dead air space is sandwiched between the inside skin and outer skin of the hull.
- Where the hull below the transducer will be in contact with the water at all times.
- Where the water flowing under the hull is smoothest with a minimum of bubbles and turbulence (especially at high speeds). Do not mount the transducer near water intake or discharge openings; or behind strakes, fittings, or hull irregularities.
- Where the transducer beam will not be blocked by the keel or propeller shaft(s).
- Away from interference caused by power and radiation sources such as: the propeller(s) and shaft(s), other machinery, other echosounders, and other cables. The lower the noise level, the higher the echosounder gain setting that can be used.
- Where the deadrise angle does not exceed either 12° on the long side of the tank or 22° on the short side of the tank.
- Where there is space inside the vessel for the size of the tank and removing the transducer.
- **CHIRP transducer**—Mount in a cool well-ventilated area away from the engine to avoid overheating the liquid inside the tank.

### Boat Types (see Figure 3)

- **Displacement hull powerboats**—Locate amidships near the centerline. The starboard side of the hull where the propeller blades are moving downward is preferred.
- **Planing hull powerboats**—Mount well aft, on or near the centerline, and *well inboard of the first set of lifting strakes* to ensure that the transducer will be in contact with the water at high speeds. The starboard side of the hull where the propeller blades are moving downward is preferred.  
**Outboard and I/O**—Mount just forward of the engine(s).  
**Inboard**—Mount well ahead of the propeller(s) and shaft(s).  
**Stepped hull**—Mount just ahead of the first step.

## Testing the Selected Mounting Location

### Establishing a Performance Baseline

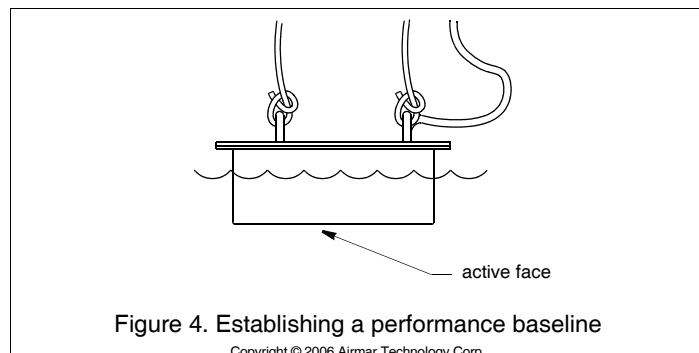
The results of this test are used as a basis of comparison to determine the best in-hull location for the transducer.

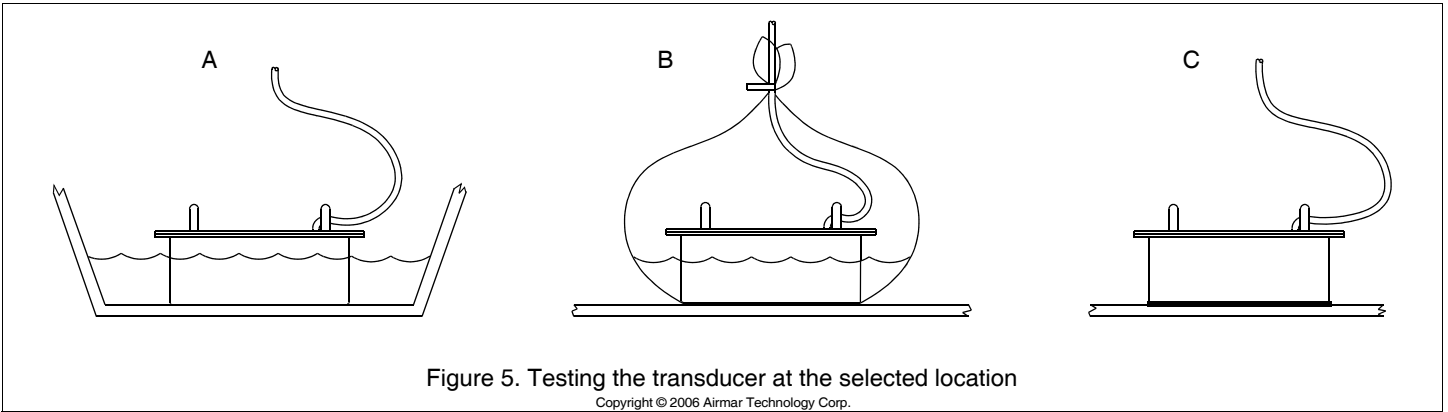
1. Take the boat to the maximum depth in which you will be operating the echosounder. If deep water is not available, find a location with at least 30m (100').
2. Connect the transducer to the echosounder.
3. Tie a rope securely around the handles of the transducer (see Figure 4). Lower it over the side of the boat until the active face is fully submerged and parallel to the water surface.
4. Observe the echosounder's performance and the depth reading.

### Testing the Location

While the boat is at the same site (depth of water), test the transducer inside the hull at the mounting location. Use one of the test methods below:

- A. If the transducer will be located near the stern and the boat has a minimum deadrise angle**—Clean away any build-up of dirt and/or grease using detergent or a weak solvent such as alcohol. Place the transducer against the hull and allow bilge water to cover the surface where they touch (see Figure 5-A).
- B. For a moderate deadrise angle**—If the hull surface is not smooth, grind it with a disc sander. Place the transducer inside a thin plastic bag. Partially fill the bag with water and close it tightly with a cable tie. Wet the surface of the hull and press the active face of the transducer against it through the bag (see Figure 5-B).





**C. For any location**—If the hull surface is not smooth, grind it with a disc sander. Coat the active face of the transducer with a water-based lubricant (such as K-Y® jelly). With a twisting motion, press the face firmly against the hull (see Figure 5-C). After testing, wipe away all traces of the lubricant from the transducer's face.

Observe the echosounder's performance and compare it to the baseline. Look for a stable depth reading that is similar to the baseline. Compare the thickness and intensity of the bottom trace.

If the performance is close to the baseline, this is a good mounting location. Remember, some energy is lost transmitting through the hull. If the test reading differs markedly from the baseline, you will need to find another location to install the transducer.

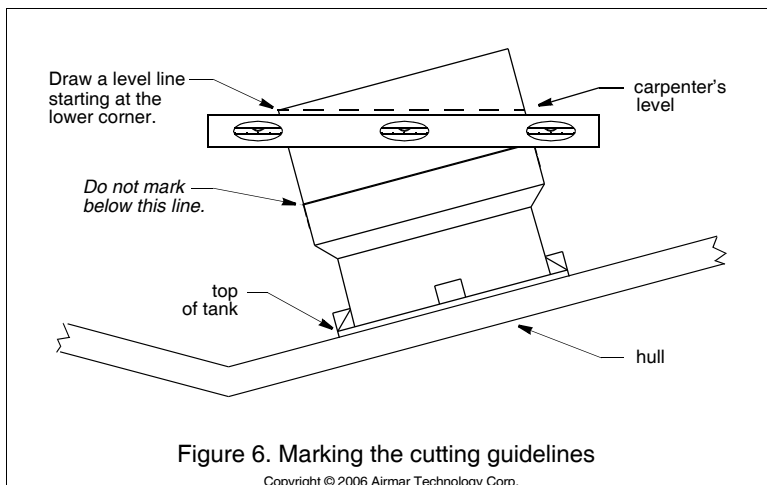
**NOTE:** If there is no reading or it is erratic, the transducer may be positioned over coring which is absorbing the acoustic energy. Choose another location. If no other location is available, check with the boat manufacturer to be certain coring is present.

## Installation

### Marking & Cutting

**CAUTION:** For optimal performance, the transducer must be installed so the beam will be aimed straight down. This is accomplished by cutting the tank to match the deadrise angle of the hull.

**CAUTION:** Do not mark or cut the tank in the space labeled "Do not cut above this line."



1. When you are satisfied that the selected mounting location is optimal, place the tank *up-side-down* on the hull (see Figure 6).

**NOTE:** The tank can be placed with either a short side or long side parallel to the centerline of the boat.

2. Holding a carpenter's level even with the *lower corner* of one of the sides to be cut, draw a *level* line on the tank. Repeat this process on the opposite side of the tank. *Connect these two lines to form the SHORTEST side of the tank.* Be sure the lines are level, as they will be the cutting guidelines.

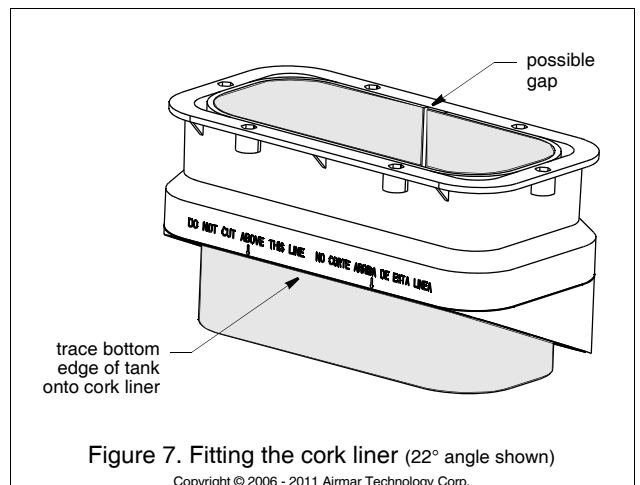
3. *Before cutting the tank, be sure the TALLEST side will be closest to the centerline (keel) of the boat after the tank is installed.* And be sure to observe the "Do not cut above this line" mark.

Using a saw, cut the three sides of the tank along the guidelines drawn. It may be necessary to further shape the tank to the hull to ensure a liquid-tight bond.

4. The tank is provided with a cork liner to reduce sound echoes. After the tank has been cut, wrap the cork liner around the *inside* of the tank (see Figure 7). Butt the sides of the liner along the center of the tallest side. Trace the bottom edge of the tank onto the liner.

**NOTE:** There may be a gap between the butted edges which will not affect performance.

5. Remove the cork liner from the tank. Use scissors to cut the liner along the line drawn.



## Bonding the Tank

**CAUTION:** The tank must be liquid-tight. To ensure a tight bond, the hull surface under and around the tank must be smooth, free of paint or any other finish, clean, and dry.

1. To ensure a tight bond, remove any paint or other hull finish. If the surface is rough, use a disk sander to smooth an area slightly larger than the tank. Clean any dust, grease, or oil from the hull surface with a weak solvent, such as alcohol. Dry the effected area.
2. Use 80 grit sand paper to sand the outside and inside of the tank up 50mm (2") above the bottom edge. Remove the dust with a weak solvent, such as alcohol. Dry the effected area.
3. Use an approved bonding material (see Tools & Materials on page 1). Glass the tank to the hull with fiberglass resin, using standard fiberglass technique. Alternatively, apply a generous bead of marine putty/sealant to the bottom edge of the tank following the manufacturer's instructions (see Figure 8). Press the tank firmly in place. Apply a second bead around the inside of the tank. And apply a third bead around the outside of the tank.
4. Allow the bonding material to cure. *The seal must be liquid-tight.*

## Installing the Transducer

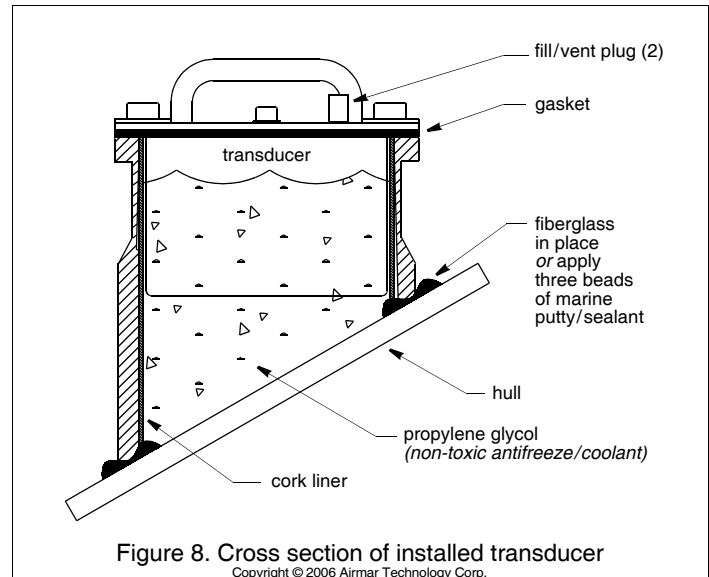
**CAUTION:** Do not use sealant or adhesive on the gasket. To do so may break the tank when the transducer is removed.

**CAUTION:** Do not over tighten the bolts to avoid cracking the tank.

1. After the bonding material has cured, insert the cork liner into the tank (see Figure 8). Butt the edges along the center of the tallest side. Note, there may be a gap, but this will not affect performance.
2. Following the manufacturer's directions for use, pour propylene glycol into the tank until it covers the exposed hull.
3. Before installing the transducer, wipe it clean of any lubricant that was used in testing the location.
4. Grasp the transducer by the handles and lower it into the tank. There is no fore or aft to the transducer; it fits either way.
5. Attach the transducer to the tank. Use the six remaining 9/16" hex-head bolts and six lock washers supplied. Tighten using a torque wrench with a force not exceeding 85 in-lb. **Do not over tighten.**
6. Top-off the propylene glycol in the tank. However, allow a small air space to accommodate expansion with temperature changes. Using a funnel, pour the fill-liquid through one of the fill/vent holes until the tank is full. The second hole will act as a vent. Plug both holes with the vent plugs supplied.

## Cable Routing & Connecting

**CAUTION:** If the transducer came with a connector, do not remove it to ease cable routing. If the cable must be cut and spliced, use Airmar's splash-proof Junction Box No. 33-035 and follow the instructions supplied. Removing the water-proof connector or cutting the cable, except when using a water-tight junction box, will void the transducer warranty.



1. Route the cable to the echosounder being careful not to tear the cable jacket when passing it through the bulkhead(s) and other parts of the boat. Use grommets to prevent chafing. To reduce electrical interference, separate the transducer cable from other electrical wiring and the engine(s). Coil any excess cable and secure it in place with cable ties to prevent damage.
2. Refer to your echosounder owner's manual to connect the transducer to the instrument.

## Operation

Monitor the transducer ID line for the internal temperature of the fill liquid within the tank. The transducer may fail if the fill-liquid reaches temperatures above 60° C (140° F).

## Replacement Transducer & Parts

The information needed to order a replacement Airmar transducer is printed on the cable tag. Do not remove this tag. When ordering, specify the part number, date, and frequency in kHz. For convenient reference, record this information at the top of page one.

Lost, broken, or worn parts should be replaced immediately.

In-Hull Mounting Kit 33-453-01

Obtain parts from your instrument manufacturer or marine dealer.

Gemeco (USA) Tel: 803-693-0777  
Fax: 803-693-0477  
email: sales@gemeco.com

Airmar EMEA Tel: 33.(0)2.23.52.06.48  
(Europe, Middle East, Africa) Fax: 33.(0)2.23.52.06.49  
Email: sales@airmar-emea.com

**AIRMAR**<sup>®</sup>  
TECHNOLOGY CORPORATION

35 Meadowbrook Drive, Milford, New Hampshire 03055-4613, USA  
www.airmar.com

Copyright © 2003 - 2013 All rights reserved.