OWNER'S GUIDE & INSTALLATION INSTRUCTIONS

Transom Mount Speed/Temperature Sensor

with Integral Bracket

Models: S69, ST69

U.S. Patents: 4,555,938; 4,644,787; 5,606,253. Canadian Patent 1,233,341

01/04

17-145-01 rev. 03

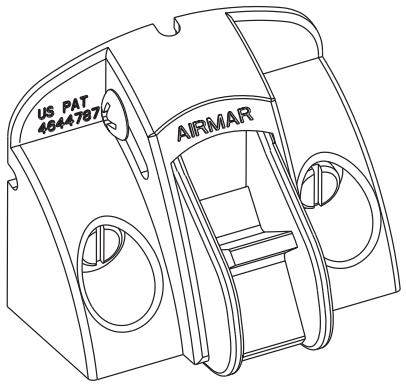
***IMPORTANT**: Please read the instructions completely before proceeding with the installation. These instructions supersede any other instructions in your instrument manual if they differ.*

CAUTION: NEVER USE SOLVENTS

Cleaners, fuel, paint, sealants, and other products may contain strong solvents, such as acetone, which attack many plastics greatly reducing their strength.

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

Part No._____Date_____



Applications

- Personal watercraft and powerboats
- *Not* recommended for boats with large or twin screw inboard engines.
- Good operation from 4–50kn (5–58MPH)
- Adjusts to transom angles from 3°–16°

Tools & Materials

Digital level *or* bubble level and protractor

Screwdrivers

Weak solvent (alcohol)

Straight edge

Safety goggles

Dust mask

Electric drill

Drill bits:

Mounting holes	5.4mm, #3, *or* 13/64"
Transom hole (optional)	18mm, 11/16", *or* 3/4"
Cable clamp holes	3mm *or* 1/8"

Masking tape

Marine sealant

Putty knife

Pencil

Zip-ties

Water-based antifouling paint (**mandatory in salt water**)

Pretest Speed & Temperature Functions

Connect the sensor to the instrument and spin the paddlewheel. Check for a speed reading (and the approximate air temperature if appropriate). If there is no reading or it is inaccurate, return the product to your place of purchase.

Mounting Location

For the best performance, the sensor *must* be in contact with aeration-free and turbulence-free water.

***Caution**: Do not mount in an area of turbulence or bubbles:*
Near water intake or discharge openings
Behind strakes, struts, fittings, or hull irregularities
Behind eroding paint (an indication of turbulence)

***Caution**: Avoid mounting the sensor where the boat may be supported during trailering, launching, hauling, or storage.*

- **Single drive boat**—Mount the sensor as close to the centerline of the boat as possible. On slower, heavier, displacement hulls positioning it farther from the centerline is acceptable (see Figure 1).
- **Twin drive boat**—Mount the sensor between the drives.

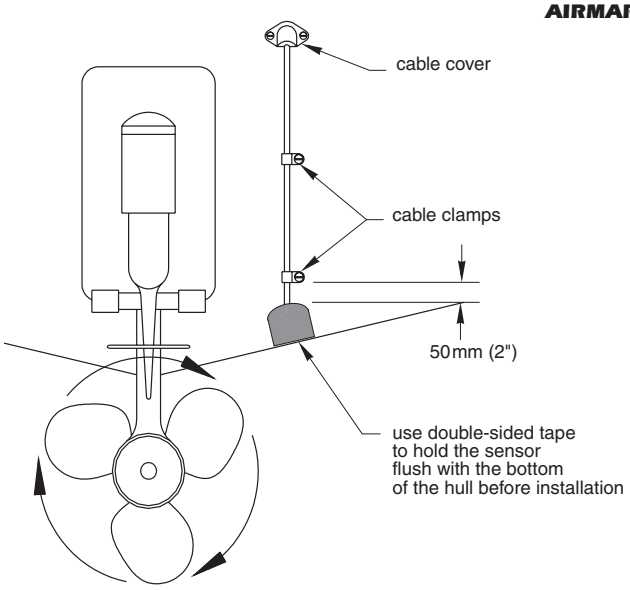


Figure 1. Mounting location on single drive boat

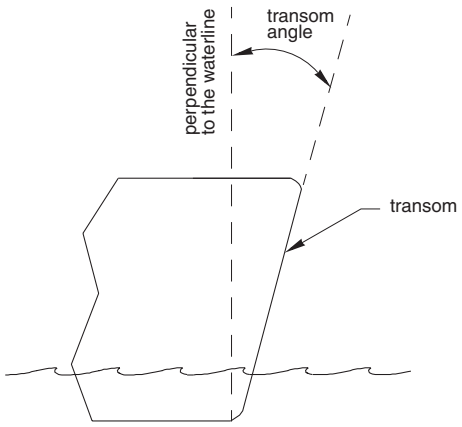


Figure 2. Measuring the transom angle

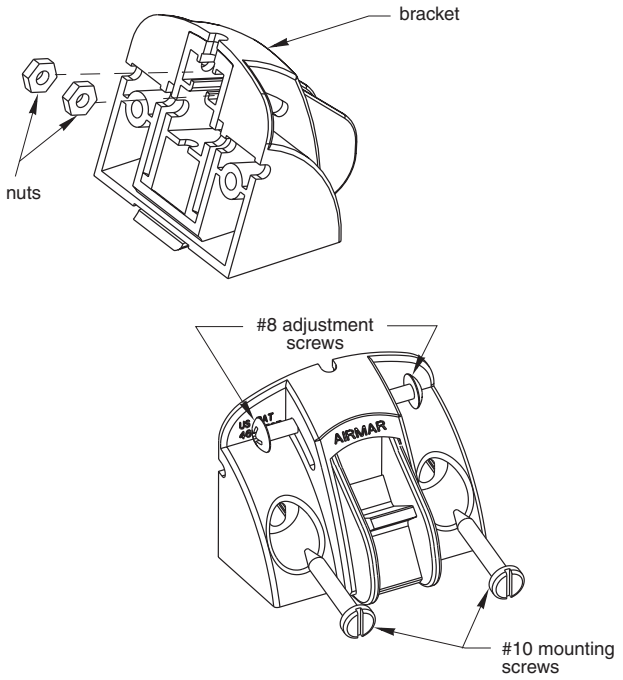


Figure 3. Installing the adjustment and the mounting screws

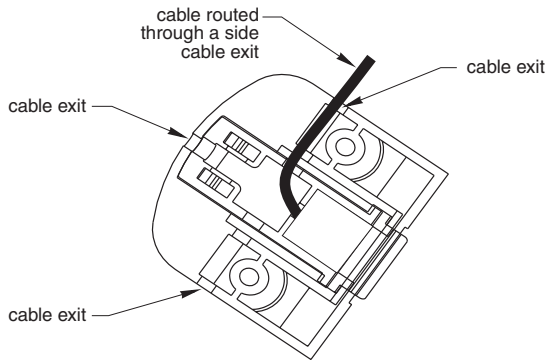


Figure 4. Routing the cable in the bracket

Installation

Caution: Measure and drill carefully, since the bracket is not adjustable.

***Note**: If the adjustable paddlewheel assembly separates from the bracket, refer to Figure 10 on page 4 to reassemble.*

Preparation

1. Measure the transom angle of the hull at the selected location using a digital level, or bubble level and protractor (see Figure 2).
2. Insert the two nuts into the slots in the back of the bracket. Install the #8 adjustment screws (see Figure 3). *Do not* tighten the screws at this time.
3. There are three possible cable exits in the back of the bracket: left, center, and right (see Figure 4). Choose the best cable exit for your installation and route the cable through the notches in the back of the bracket.

Mounting

1. The hull surface must be free of any dust, oil, grease, or loose paint. Clean the selected location with a weak solvent, such as alcohol.

   ***Caution**: The bottom edge of the adjustable paddlewheel assembly (not the bracket) must be **flush** with the bottom of the hull.*
2. At the selected location and **flush** with the bottom of the hull, stick the double-sided tape to the transom (see Figure 1). Peel off the remaining non-stick layer.
3. Holding a straight edge against the bottom of the hull, position the sensor at the selected location (see Figure 5). **The bottom edge of the adjustable paddlewheel assembly (not the bracket) must be flush with the bottom of the hull.** Press the bracket firmly in place. Use additional double-sided tape if necessary.

   ***Warning**: Always wear safety goggles and a dust mask.*
4. Using a 5.4mm, #3, or 13/64" drill bit, drill the two mounting holes *perpendicular* to the transom. To prevent drilling too deeply, wrap masking tape around the bit 13mm (1/2") from the point. **Fiberglass hull**—Minimize surface cracking by running the drill in reverse until the gelcoat is penetrated.
5. Apply marine sealant to the two, #10 x 1-1/4", mounting screws to prevent water seepage into the transom. Screw the sensor to the hull (see Figure 3).

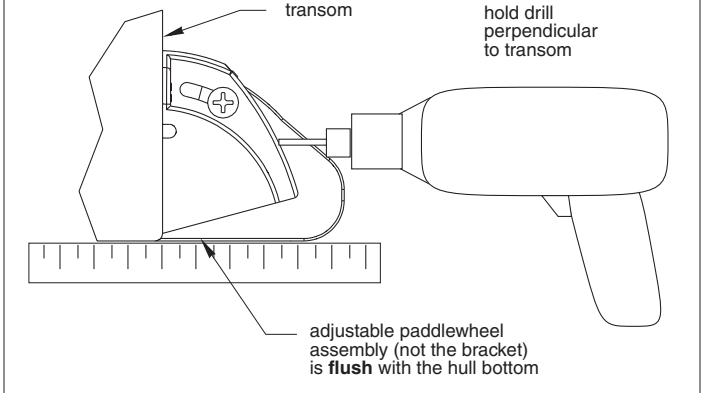


Figure 5. Positioning the sensor

Adjusting

1. Holding a straight edge against the bottom of the hull, push the adjustable paddlewheel assembly down until it touches the straight edge and is flush with the bottom of the hull (see Figure 6). Tighten the adjustment screws to 1/4 turn past snug. *Do not* over-tighten.

Caution: Filling the gap between the sensor and the hull is critical to the proper operation of the sensor.

2. Fill the gap between the sensor and the hull with marine sealant using a putty knife for smoothing (see Figure 7). Pay particular attention to the transition from the hull to the adjustable paddlewheel assembly. This will ensure smooth water flow over the paddlewheel.

Testing on the Water

Observe the speed readings while gradually increasing the boat speed. If they appear to be inaccurate, do one of the following:

- Re-calibrate your instrument to compensate for the flow characteristics of your boat. Refer to your owner's manual for instructions. Some instruments do not have a calibration feature so no adjustment is possible.
- Tilt the adjustable paddlewheel assembly down 2°–3° or until it is 3mm (1/8") lower than the bottom of the hull (see Figure 8).
- If the degradation is sudden (not gradual), identify the boat speed at which the onset occurred. Return the boat to this speed, then gradually increase speed while making moderate turns in both directions. If the performance improves while turning to the side on which the sensor is installed, it's location probably needs to be changed. The paddlewheel is coming out of the water. Move the sensor closer to the centerline. Fill unused screw holes with marine sealant.

Cable Routing

Route the sensor cable over the transom, through a drain hole, or through a new hole drilled in the transom **above the waterline**.

***Caution**: Never cut the cable or remove the connector; this will void the warranty.*

***Warning**: Always wear safety goggles and a dust mask.*

1. If a hole must be drilled, choose a location **well above the waterline** (see Figure 1). Check for obstructions such as trim tabs, pumps, or wiring inside the hull. Mark the location with a pencil. Drill a hole through the transom using the appropriate size bit to accommodate the connector.
2. Route the cable over or through the transom.
3. On the outside of the hull secure the cable to the transom using the cable clamps. Position one cable clamp 50mm (2") above the bracket and mark the mounting hole with a pencil.
4. Position the second cable clamp halfway between the first clamp and the cable hole. Mark this mounting hole.
5. If a hole has been drilled in the transom, open the appropriate slot in the cable cover. Position the cover over the cable where it enters the hull. Mark the two mounting holes.
6. At each of the marked locations, use a 3mm or 1/8" bit to drill a hole 10mm (3/8") deep. To prevent drilling too deeply, wrap masking tape around the bit 10mm (3/8") from the point.
7. Apply marine sealant to the threads of the #6 x 1/2" self-tapping screws to prevent water from seeping into the transom. If you have drilled a hole through the transom, apply marine sealant to the space around the cable where it passes through the transom.

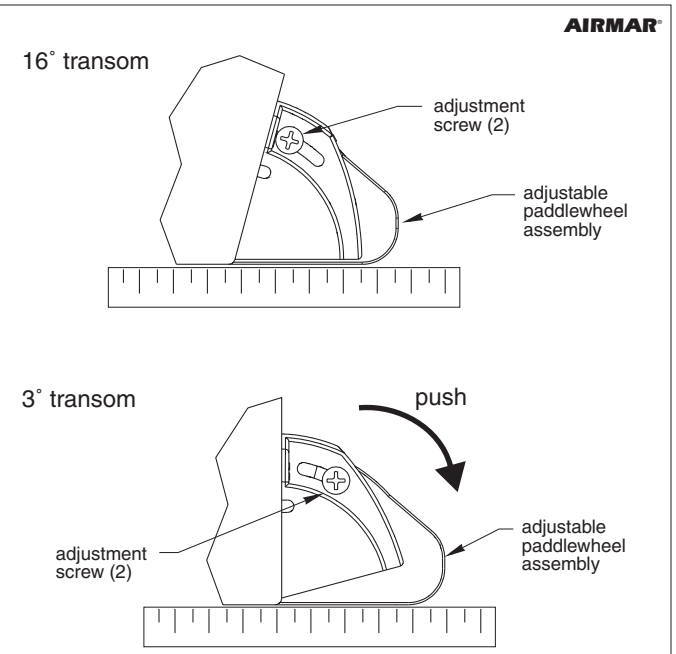


Figure 6. Angle adjustment

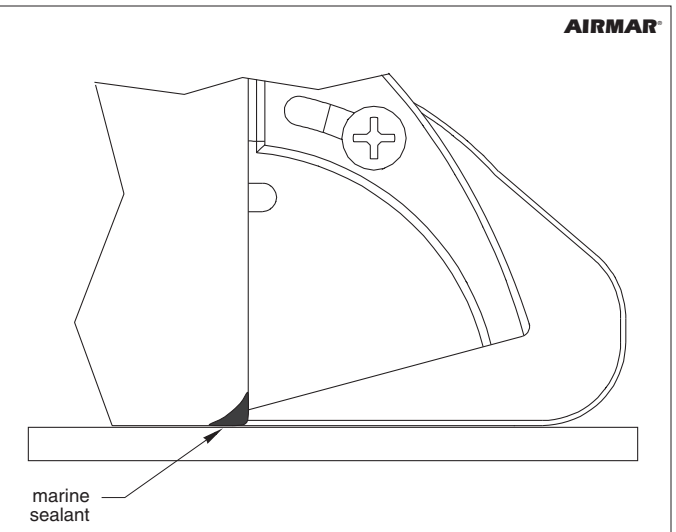


Figure 7. Filling the gap

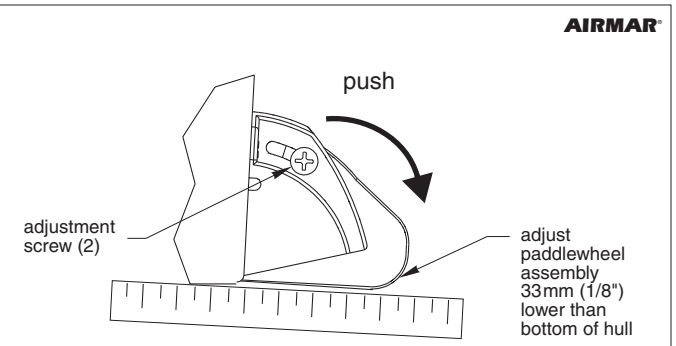


Figure 8. Tilting the adjustable paddlewheel assembly

8. Position the two cable clamps and fasten them in place. If used, push the cable cover over the cable and screw it in place.
9. Route the cable to the instrument *being careful* not to tear the cable jacket when passing it through the bulkhead(s) and other parts of the boat. To reduce electrical interference, separate the sensor cable from other electrical wiring and the engine(s). Coil any excess cable and secure it in place with zip-ties to prevent damage.
10. Refer to your instrument owner's manual to connect the sensor to the instrument.

Checking for Leaks

***Warning**: When the boat is placed in the water, **immediately** check for leaks around the screws and any holes drilled in the hull. Never install a sensor and leave the boat in the water unchecked for several days.*

Maintenance

Antifouling Paint

Aquatic growth can accumulate rapidly on the sensor's surface reducing performance within weeks. Surfaces exposed to salt water that do not interlock must be coated with antifouling paint. Use *water-based or mineral spirits based* antifouling paint only. *Never* use ketone based paint since ketones can attack many types of plastic. Apply paint every 6 months or at the beginning of each boating season.

Servicing the Paddlewheel

***Caution**: Do not move the assembly past the shaft holes as any gap filler will be damaged.*

Clean the sensor with a soft cloth and mild household detergent. If the paddlewheel becomes fouled or inoperable, remove it for cleaning. Remove the two adjustment screws and push the adjustable paddlewheel assembly down until the paddlewheel shaft is exposed (see Figure 9). **Do not move the assembly past the shaft holes as any gap filler will be damaged.** Push out the paddlewheel shaft with a 1/16" punch. Use a stiff brush or putty knife to remove the growth. In severe cases, wet sand the surface with fine grade wet/dry paper.

Orient the short side of the paddlewheel blades as shown in Figure 10. Slide the shaft through the holes in the adjustable paddlewheel assembly and the paddlewheel. *Be sure* the ends of the shaft are flush with the housing.

Parts

Replace broken or worn parts immediately. The water-lubricated paddlewheel bearings have a life of up to 5 years on low-speed boats [less than 10 knots (11 MPH)] and 2 years on high-speed vessels. Purchase Paddlewheel Kit 33-398 from your marine dealer or instrument manufacturer.

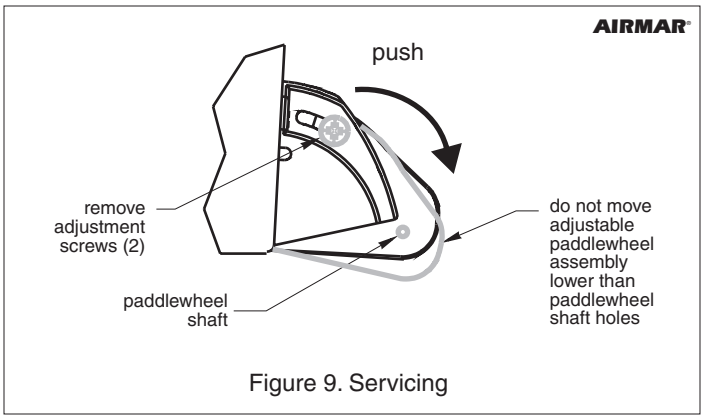


Figure 9. Servicing

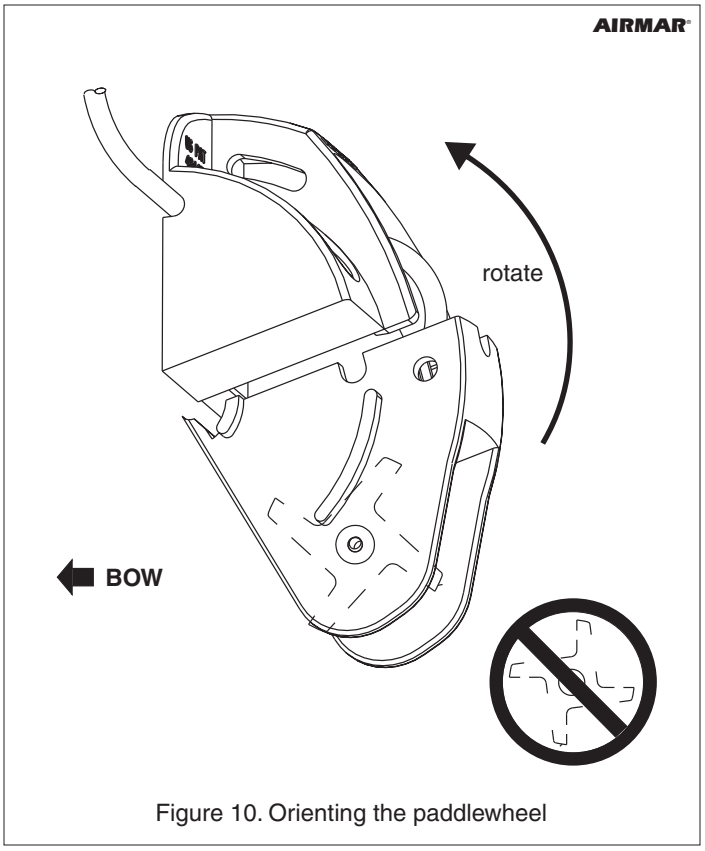


Figure 10. Orienting the paddlewheel

Sensor Replacement

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