

# INSTALLATION INSTRUCTIONS

Multisensor



## Installation Instructions

Multisensor  
Kit Number 3849224

## **IMPORTANT!**

This kit with its accompanying instructions is produced for Volvo Penta's service workshops, boat-builders, machine manufacturers and other authorized workshops which have personnel with qualified professional training.

The installation instructions are only produced for professional use and are not intended for non-professional use. Volvo Penta will not assume any liability whatsoever for damage incurred, either damage to materials or personal injury, which may result if the installation instructions are not followed or if the work is carried out by non-professional personnel.

## **WICHTIG!**

Dieser Satz mit vorliegender Einbauanleitung ist für Volvo Penta Kundendienst-werkstätten, Werften, Maschinenbauer und für andere ermächtigte Werkstätten mit beruflich geschultem Personal vorgesehen.

Die Einbauanleitung ist nur für den berufsmäßigen Gebrauch vorgesehen und nicht für unprofessionelle Anwendung gedacht. Volvo Penta übernimmt nicht die geringste Haftung für irgendwelchen Schäden an Personen oder Sachen, die als Folge einer Nichtbefolgung der Einbauanleitung oder wegen Ausführung der darin beschriebenen Arbeiten durch nicht beruflich geschulte Personen entstehen.

## **IMPORTANT!**

Ce kit, avec instructions de montage, est destiné aux ateliers de service Volvo Penta, aux constructeurs de bateaux et autres ateliers de construction agréés avec un personnel qualifié.

Les instructions de montage sont exclusivement conçues pour une utilisation professionnelle. Volvo Penta se dégage de toute responsabilité pour d'éventuels endommagements, corporels ou matériels, résultant du non respect des instructions ou d'un travail effectué par un personnel non compétent.

## **IMPORTANTE!**

El presente juego con las instrucciones de montaje se destina a los talleres de servicio Volvo Penta, constructores de embarcaciones y máquinas y a otros talleres autorizados que cuentan con personal capacitado.

Las instrucciones de montaje están destinadas únicamente para uso profesional, por lo que Volvo Penta no aceptará responsabilidad alguna por cualquier daño, tanto personal como material, resultado de no haber seguido las instrucciones de montaje o de haber sido efectuado el trabajo por personal que no está debidamente capacitado.

## **IMPORTANTE!**

Questo kit e le relative istruzioni di montaggio sono stati realizzati per le officine di servizio Volvo Penta, i cantieri, i fabbricanti di macchine e tutte le altre officine autorizzate il cui personale ha ricevuto un addestramento qualificato e specializzato.

Le istruzioni di montaggio sono state redatte esclusivamente per uso professionale e non sono adatte all'uso non professionale. La Volvo Penta non si assume alcuna responsabilità per eventuali danni alle cose o alle persone, derivanti da trascuratezza nel seguire le istruzioni di montaggio oppure dall'esecuzione dei lavori da parte di personale non qualificato.

## **VIKTIGT!**

Denna sats med föreliggande monteringsanvisning är framtagen för Volvo Pentas serviceverkstäder, båtbyggare, maskintillverkare och övriga auktoriserade verkstäder som har personal med kvalificerad fackutbildning.

Monteringsanvisningen är enbart framtagen för yrkesbruk och är inte avsedd för icke yrkesmässig användning. Volvo Penta påtager sig inget som helst ansvar för eventuella skador, såväl materiella som personskador, som kan bli följden om monteringsanvisningen ej följs, eller om arbetet utförs av icke yrkeskunnig personal.

## **VIGTIGT!**

Dette sæt med tilhørende monteringsvejledning er blevet udviklet for Volvo Pentas serviceværksteder, bådbyggere, maskinproducenter og andre autoriserede værksteder, som har medarbejdere med kvalificeret, faglig uddannelse.

Monteringsvejledningen er udelukkende beregnet til professionel anvendelse og ikke til hobby- eller fritidsbrug. Volvo Penta påtager sig intet som helst ansvar for eventuelle skader på såvel materiel som personer, som kan være en følge af at monteringsvejledningens anvisninger ikke blev overholdt, eller hvis arbejdet blev udført af ikke-professionelt personale.

## **TÄRKEÄ!**

Tämä sarja ja asennusohje on tarkoitettu Volvo Pentan huolto-korjaamoille, veneenrakentajille, konevalmistajille ja muille valtuutetuille korjaamoille, joiden henkilökunta on saanut pätevän ammattikoulutuksen.

Asennusohje on tarkoitettu ainoastaan ammattikäyttöön. Volvo Penta ei vastaa mahdollisista materiaali- tai henkilövahingoista, joita asennusohjeen laiminlyöminen tai ammattitaidottoman henkilökunnan suorittama asennustyö voi aiheuttaa.

## **BELANGRIJK!**

Deze set met de bijgevoegde montage-aanwijzing is ontwikkeld voor de werkplaatsen van Volvo Penta, botenbouwers, machinefabrikanten en overige bevoegde werkplaatsen, die personeel hebben met een gekwalificeerde vakopleiding.

De montage-aanwijzing is alleen ontwikkeld voor professioneel gebruik en is niet bedoeld voor niet-professioneel gebruik. Volvo Penta neemt geen enkele verantwoordelijkheid op zich voor eventuele schade, zowel materiële schade als persoonlijk letsel, die het gevolg kan zijn als de montage-aanwijzing niet wordt gevolgd, of als het werk wordt uitgevoerd door niet-vakkundig personeel.

## **IMPORTANTE!**

Este jogo, juntamente com as respectivas instruções de montagem, foi concebido para as oficinas de serviço da Volvo Penta, construtores navais, construtores de máquinas e outras oficinas autorizadas, com pessoal devidamente formado.

As instruções de montagem foram concebidas unicamente para utilização profissional e não se destinam a utilização não profissional. A Volvo Penta não se responsabiliza por quaisquer danos eventuais, tanto materiais como pessoais, que possam resultar no caso de as instruções de montagem não serem seguidas, ou se os trabalhos forem executados por pessoal não profissional.

## **ΠΡΟΣΟΧΗ!**

Το περιεχόμενο αυτού του πακέτου μαζί με τις οδηγίες συναρμολόγησης που το ακολουθούν είναι ειδικά επιλεγμένο για συνεργεία σέρβις της Volvo Penta, ναυπηγεία, κατασκευαστές μηχανών και για λοιπά εξουσιοδοτημένα συνεργεία που διαθέτουν εξειδικευμένο προσωπικό.

Οι οδηγίες συναρμολόγησης προορίζονται μόνο για επαγγελματική χρήση και δεν αποσκοπούν για χρήση από μη επαγγελματίες. Η Volvo Penta δεν αναλαμβάνει απολύτως καμία ευθύνη για πιθανές ζημιές, τόσο υλικές όσο και προσωπικές, που μπορούν να προκληθούν επειδή δεν ακολουθούνται οι οδηγίες συναρμολόγησης ή επειδή η εργασία εκτελείται από μη εξειδικευμένο προσωπικό.

## Introduction

This installation instruction covers parts or accessories manufactured or marketed by Volvo Penta and used in the specified application and for the intended purpose recommended by Volvo Penta. Any use other than those specified may give unpredictable results and result in equipment failure or personal injury.

Proper preparation is extremely helpful for efficient service work. A clean work area at the start of the job will minimize tools and parts becoming misplaced. Obtain tools, instruments and parts needed for the job before work is started. Interrupting a job to locate special tools or repair kits is a needless delay.

When following these instructions the installer must adhere to all U.S. Coast Guard Safety Regulations and ABYC Recommendations and Standards, or other regional regulation that may be in effect.

## Service Policy

Whether within or following the warranty period, Volvo Penta has a constant interest in our products.

It is Volvo Penta's policy to provide dealers with service knowledge so they can give professional service demanded by today's consumer. Volvo Penta Service Schools, frequent mailing of Service Bulletins, Letters and Promotions, Special Tools and these instructions represent Volvo Penta's efforts in giving consumers the best and most prompt service possible. If a service question does not appear to be answered in these instructions, you are invited to call or write to the Volvo Penta Service Department for additional help. Always be sure to give complete information, including engine model and serial number.

Be sure you are familiar with Volvo Penta's Warranty. If you have any questions, call or write the Volvo Penta Service Department. If other than genuine Volvo Penta parts and components are used, Volvo Penta may refuse subsequent warranty claims involving that engine.

When a brand-name product or specific tool is specified, another item may be used. However, the substitute must have equivalent characteristics, including type, strength, and material. It is your responsibility to determine if incorrect substitution could result in product malfunction and personal injury to anyone. To avoid hazards, equivalent products which are used must meet all U.S. Coast Guard Safety Regulations and ABYC standards.

## References, Illustrations and Specifications

Volvo Penta reserves the right to make changes at anytime, without notice, to specifications, models, and procedures. Also, the right to change any specifications or parts at any time without incurring any obligation to equip same models manufactured prior to date of such change. All information, photographs, illustrations, and specifications, contained in these instructions are based on the latest information available at the time of printing.

Photographs and illustrations used in this instruction may not depict actual models or equipment. The continuing accuracy of this installation instruction cannot be guaranteed.

Use the general torque specification for all fasteners unless otherwise specified in the instructions.

## Important Safety Notices

Carefully observe the safety alert symbols below for dangers, warnings, and cautions. They alert installers and operators of possible dangers or important information contained in this manual. **Warnings alone do not eliminate hazards. They are no substitute for professional workmanship and proper installation.**



**DANGER!** Failure to comply with a danger symbol will result in serious injury or death to boat operator, boat occupants, and/or others.



**WARNING!** Failure to comply with a warning may result in injury or death to boat operator, boat occupants and/or others.



**CAUTION!** Failure to comply with a caution may result in failure or damage to the equipment.

**NOTE!** Special attention should be used to prevent incorrect assembly or disassembly.

## Kit Purpose

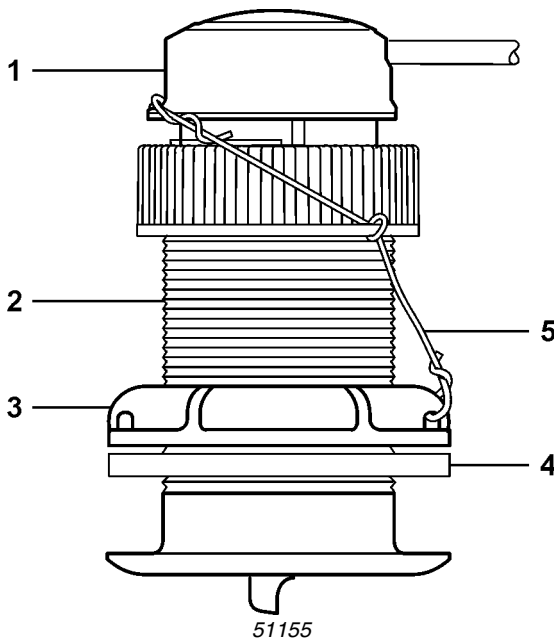
This kit provides parts and instructions for installing a multisensor in a boat's hull.

### Kit Contents (PN 3849224)

Item #	Description	Qty
1	Sensor Unit - Insert	1
2	Sensor Housing	1
3	Hull Nut	1
4	Washer	1
5	Safety Wire	1
	Lubricant tube <sup>1</sup>	2
	Blanking Plug <sup>2</sup>	1

1. Not shown

2. Shown in illustration #51152



### Tools Required

- Water-based transducer (antifouling) paint
- Safety goggles and dust mask
- Electric drill, minimum 10 mm (3/8 in.) capacity
- Drill bit, 3 mm (1/8 in.)
- Hole saw, 51 mm (2 in.)
- Countersink tool (installing a flush housing)
- File (installation in a metal hull)
- Sandpaper
- Mild household detergent or weak solvent (such as alcohol)
- Marine sealant
- Additional washer – for aluminum hulls less than 6 mm (1/4 in.) thick
- Zip-ties

Installation in a cored fiberglass hull:

- Hole saw for hull interior, 60 mm (2-3/8 in.)
- Fiberglass cloth and resin or Cylinder, wax, tape, and casting epoxy

### General

#### Retractable Multisensor

**CAUTION!** 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.

#### Applications

The Retractable Multisensor has a plastic housing and is recommended for fiberglass or metal hulls only.

**CAUTION!** Never install a plastic housing in a wood hull since swelling of the wood may over-stress the plastic, causing a fracture.

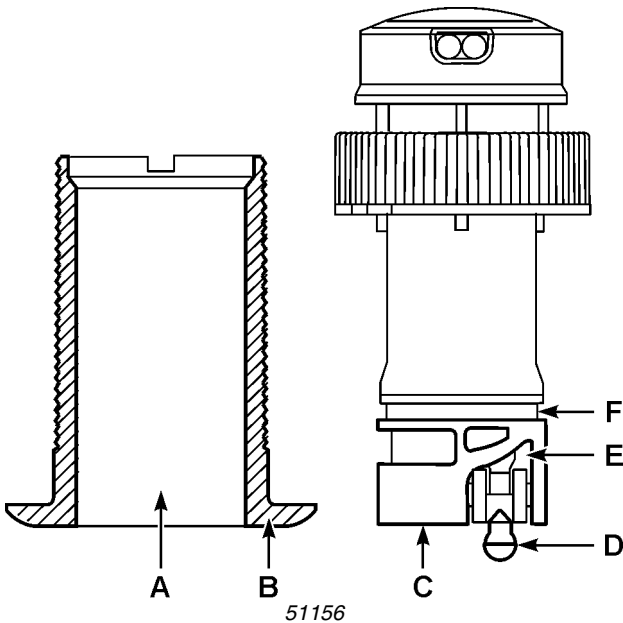
## Pretest

Connect the multisensor to the display (please refer to the Volvo Penta Color Monitor Installation Instructions) and spin the paddlewheel. Check for a speed reading and, if applicable, the approximate air temperature. If there is no reading or it is inaccurate, return the instrument to the place of purchase.

## Transducer (Antifouling) Paint

Marine growth can accumulate rapidly on the multisensor's surface, reducing performance within weeks. Surfaces exposed to salt water must be coated with antifouling paint (sold as transducer paint). Use water-based antifouling paint only. Never use ketone-based paint since ketones can attack many plastics, possibly damaging the sensor.

It is easier to apply antifouling paint before installation, but be sure to allow sufficient drying time. Re-apply paint every 6 months or at the beginning of each boating season. Paint the following surfaces:

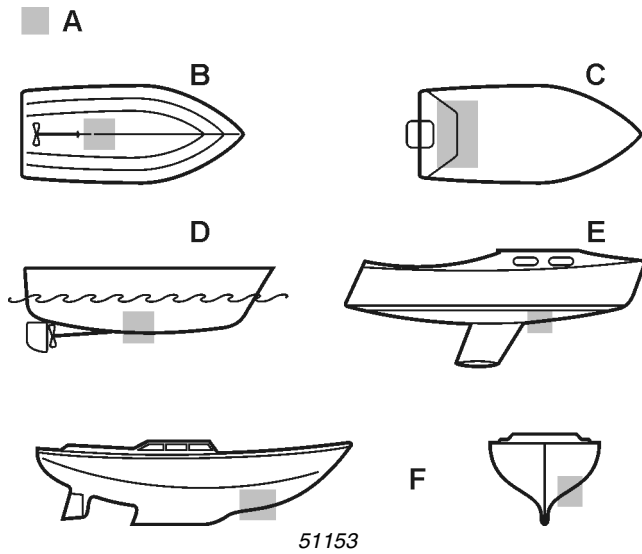


- A. Inside bore of housing up 30 mm (1-1/4")
- B. Exterior lip of housing
- C. Exposed end
- D. Paddlewheel
- E. Paddlewheel cavity
- F. Outside wall below lower O-ring

## Mounting Location

- The starboard side of the hull where the propeller blades are moving downward is preferred.
- The multisensor must be continuously immersed in water.
- The water flowing across the hull must be smooth with a minimum of bubbles and turbulence (especially at high speeds).
- The transducer beam must be unobstructed by the keel or propeller shaft(s).
- Choose a location with a minimum deadrise angle.
- Inside the vessel, choose an accessible spot with adequate headroom for the height of the housing, tightening the nuts, and removing the insert. Allow a minimum of 280 mm (11 in.).

## Hull Types



- A. Best location for multisensor
  - B. Small displacement hulls
  - C. Planing hulls
  - D. Large displacement hulls
  - E. Fin keel sailboats
  - F. Full keel sailboats
- **Displacement hull powerboats** – Locate amidships near the centerline.
  - **Planing hull powerboats** – Mount well aft, on or near the centerline, and well inboard of the first set of lifting strakes to insure that the multi-sensor is in contact with the water at high speeds.  
**I/O:** Mount just forward of the engine(s).  
**Inboard:** Mount well ahead of the propeller(s) and shaft(s).  
**Step-hull:** Mount just ahead of the first step.  
**Boat capable of speeds above 25 knots (29 MPH):** Review the installation location and operating results of similar boats before proceeding.
  - **Fin keel sailboats** – Mount on or as close as possible to the centerline and forward of the fin keel 300–600 mm (1–2 ft.).
  - **Full keel sailboats** – Locate amidships and away from the keel at the point of minimum deadrise.

**NOTE!** Do not mount the multisensor in an area of turbulence or bubbles: near water intake or discharge openings; behind strakes, fittings or hull irregularities; or behind eroding paint (an indication of turbulence).

## Installation

For installation in a cored fiberglass hull, please follow the directions provided in the section entitled *Installation in a Cored Fiberglass Hull* on page 7.

## Hole Drilling

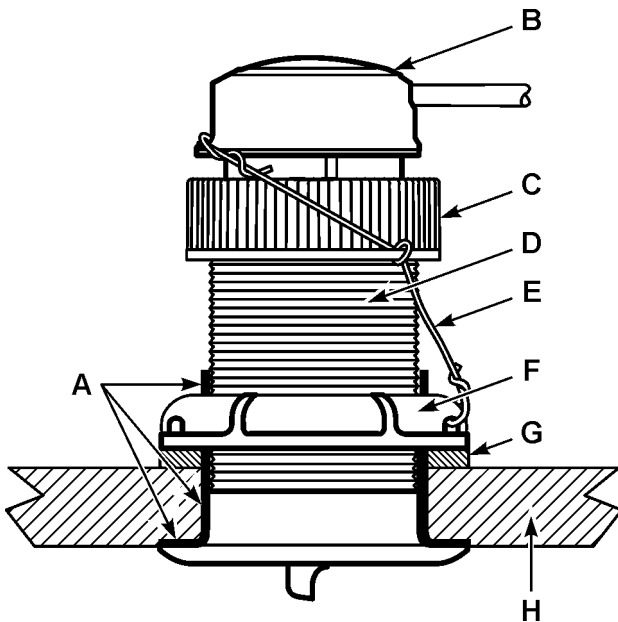


**DANGER!** Always wear safety goggles and a dust mask.

1. Drill a 3 mm (1/8 in.) pilot hole from inside the hull. If there is a rib, strut or other hull irregularity near the selected mounting location, drill from the outside.
2. Using the appropriate size hole saw, cut a hole from outside the hull. **Flush housing** – Use a countersink tool to make a “seat” in the hull.
3. Sand and clean the area around the hole, inside and outside, to ensure that the sealant will adhere properly to the hull. If there is any petroleum residue inside the hull, remove it with either mild household detergent or a weak solvent (alcohol) before sanding. **Metal hull** – Remove all burrs with a file and sandpaper.


## Bedding

Apply a 2 mm (1/16 in.) thick layer of marine sealant around the lip of the housing that contacts the hull and up the sidewall of the housing. The sealant must extend 6 mm (1/4 in.) higher than the combined thickness of the hull, washer(s), and hull nut. This will ensure there is sealant in the threads to seal the hull and to hold the hull nut securely in place.



- A. Marine sealant
- B. Insert
- C. Cap nut
- D. Housing
- E. Safety wire
- F. Hull nut
- G. Washer
- H. Hull

## Installing

 **CAUTION!** Never pull, carry, or hold the multisensor by the cable as this may sever internal connections.

1. From outside the hull, push the housing into the mounting hole using a twisting motion to squeeze out excess sealant (see illustration #51154). Align the arrow on the lip of the housing to point forward toward the bow. If the multisensor is not installed on the centerline, angle the housing slightly toward the centerline to align it with the water flow.

2. From inside the hull, slide the washer onto the housing.

**Aluminum hull less than 6 mm (1/4 in.) thick –**


Use an additional rubbery, fiberglass, or plastic washer. Never use bronze since electrolytic corrosion will occur. Never use wood since it will swell, possibly fracturing the plastic housing.

3. Screw the hull nut in place being sure the arrow on the lip of the housing is still positioned forward toward the bow.


**Housing** – Do not clamp tightly on the wrenching flats as this may cause the housing to fracture.

**Hull nut** – Hand-tighten only. Do not over tighten.


4. Remove any excess sealant on the outside of the hull to ensure smooth water flow over the multisensor.

 **CAUTION!** The O-rings must be intact and well lubricated to make a watertight seal. Failure to create a watertight seal could lead to flooding of the boat.


5. After the sealant cures, inspect the O-rings on the insert (replace if necessary) and lubricate them with the silicone lubricant supplied.

 **CAUTION!** Be sure the insert is fully inserted into the housing and the cap nut is screwed on completely.

6. Slide the paddlewheel insert into the housing with the arrow on the top pointing forward toward the bow. Screw the cap nut several turns until the threads are engaged. The arrow on the top of the insert, the cable exit, and the arrow on the lip will all be aligned. Continue to tighten the cap nut. Be careful not to rotate the housing and disturb the sealant. Hand-tighten only. Do not over tighten.

 **WARNING!** Always attach the safety wire to prevent the insert from backing out in the unlikely event that the cap nut fails or is screwed on incorrectly.


7. Attach the safety wire to one eye in the hull nut. Lead the wire in a counterclockwise direction and thread it through one eye in the cap nut. Thread the wire through the eye a second time. Then lead the wire through the eye in the insert. Twist the wire securely to itself.

 **CAUTION!** Do not remove the connector to ease cable routing. Cutting the cable or removing the connector will void the warranty.

8. Route the cable to the display, 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 multisensor cable from other electrical wiring and the engine. Coil any excess cable and secure it in place with zip-ties to prevent damage.

9. Connect the multisensor to the display according to the directions provided in the Volvo Penta Color Monitor Installation Instructions.

## Checking for Leaks

 **CAUTION!** Never install a through-hull multisensor and leave the boat in the water unchecked for several days.

When the boat is placed in the water, immediately check around the through-hull multisensor for leaks. Note that very small leaks may not be readily observed. It is best not to leave the boat in the water for more than 3 hours before checking it again. If there is a small leak, there may be considerable bilge water accumulation after 24 hours. If a leak is observed, immediately repeat the procedures *Bedding* on page 5 and *Installing* on page 6.



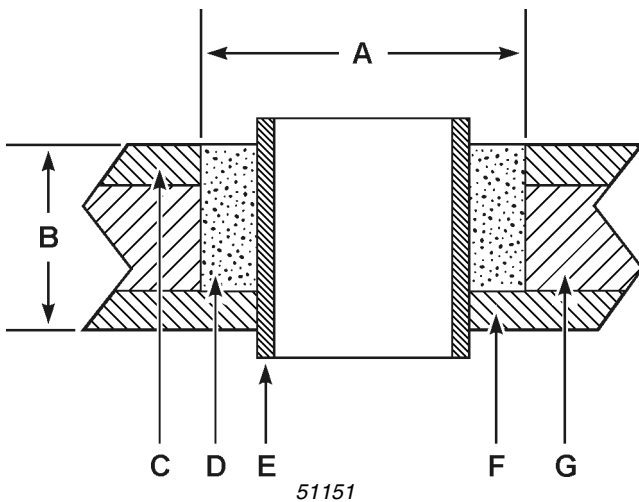
## Installation in a Cored Fiberglass Hull

The core (wood or foam) must be cut and sealed carefully. The core must be protected from water seepage, and the hull must be reinforced to prevent it from crushing under the hull nut allowing the housing to become loose.



**DANGER!** Always wear safety goggles and a dust mask.

### Preparing a Cored Fiberglass Hull



- A. 9-12 mm (3/8-1/2 in.) larger than the hole through the hull's outer skin
  - B. Hull thickness
  - C. Inner skin
  - D. Pour-in casting epoxy
  - E. Solid or hollow cylinder
  - F. Outer skin
  - G. Core
1. Drill a 3 mm (1/8 in.) pilot hole from inside the hull. If there is a rib, strut, or other hull irregularity near the selected mounting location, drill from the outside. (If the hole is drilled in the wrong location, drill a second hole in a better location. Apply masking tape to the outside of the hull over the incorrect hole and fill it with epoxy.)
  2. Using a 51 mm (2 in.) hole saw, cut the hole from outside the hull through the outer skin only.
  3. From inside the hull, use a 60 mm (2-3/8 in.) hole saw to cut through the inner skin and most of the core. The core material can be very soft. Apply only light pressure to the hole saw after cutting through the inner skin to avoid accidentally cutting the outer skin.
  4. Remove the plug of core material so the inside of the outer skin and the inner core of the hull are fully exposed. Sand and clean the inner skin, core, and the outer skin around the hole.



**CAUTION!** Completely seal the hull to prevent water seepage into the core. Failure to create a watertight seal could lead to flooding of the boat.

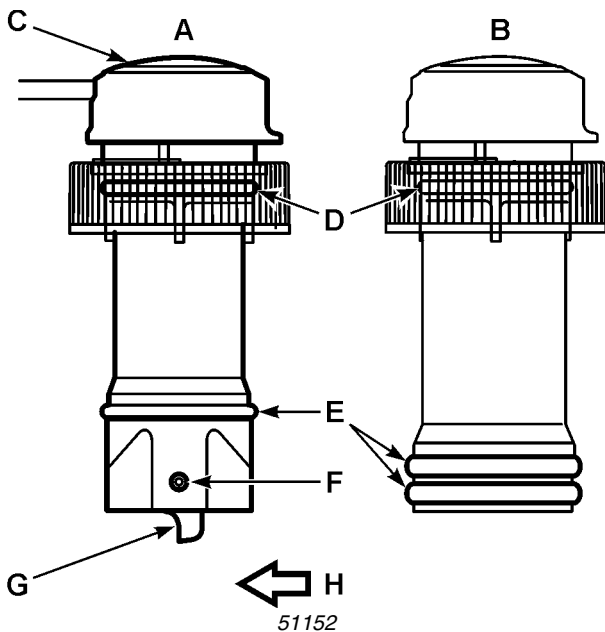
- If you are skilled with fiberglass, saturate a layer of fiberglass cloth with a suitable resin and lay it inside the hole to seal and strengthen the core. Add layers until the hole is the correct diameter.

Alternatively, a hollow or solid cylinder of the correct diameter can be coated with wax and taped in place. Fill the gap between the cylinder and hull with casting epoxy. After the epoxy has set, remove the cylinder.

- Sand and clean the area around the hole, inside and outside, to ensure that the sealant will adhere properly to the hull. If there is any petroleum residue inside the hull, remove it with either mild household detergent or a weak solvent (alcohol) before sanding.
- Proceed with the procedures *Bedding* on page 5 and *Installing* on page 6.

## Maintenance, Repair & Parts

### Using the Blanking Plug



- Insert
- Blanking plug
- Arrow
- Large O-ring
- Small O-ring
- Shaft
- Flat side of blade faces bow
- Bow

To protect the paddlewheel, use the blanking plug when the boat will be kept in salt water for more than a week, the boat will be removed from the water, or aquatic growth build-up on the paddlewheel is suspected due to inaccurate readings from the instrument.



**CAUTION! The O-rings must be intact and well lubricated to make a watertight seal. Failure to create a watertight seal could lead to flooding of the engine compartment.**

- Inspect the O-rings on the blanking plug (replace if necessary) and lubricate them with the silicone lubricant supplied or petroleum jelly (Vaseline®).

2. Remove the insert from the housing by removing the safety wire and unscrewing the cap nut (see illustration #51154). This will jack out the insert.
3. With the blanking plug ready in one hand, pull the insert most of the way out. Remove the insert and rapidly replace it with the blanking plug. With practice, only 250 ml (10 oz.) of water will enter the boat.



**CAUTION! Be sure the blanking plug is fully inserted into the housing, and the cap nut is screwed on completely.**

4. Screw the cap nut several turns until the threads are engaged. Continue to tighten the cap nut. Hand-tighten only. Do not over tighten.



**WARNING! Always attach the safety wire to prevent the insert from backing out in the unlikely event that the cap nut fails or is screwed on incorrectly.**

5. Reattach the safety wire.

## Servicing the Insert

Aquatic growth can accumulate rapidly on the multisensor's surface and impede or freeze the paddlewheel's rotation, reducing performance within weeks. Clean the insert with a Scotch-Brite® scour pad and mild household detergent, being careful to avoid scratching the depth transducer. If fouling is severe, remove the paddlewheel. Lightly wet sand it with fine grade wet/dry paper.

The water lubricated paddlewheel bearings have a life of up to 5 years on low-speed boats—less than 10 knots (11 MPH)—and 1 year on high-speed vessels. Paddlewheels can fracture and shafts can bend due to impact with water borne objects and mishandling in boat yards. O-rings must be free of abrasions and cuts to ensure a watertight seal.

1. Remove the old paddlewheel shaft with needle-nose pliers (see illustration #51152).
2. Place the new paddlewheel in the cavity with the flat side of the blade facing the same direction as the arrow on the top of the insert.
3. Tap the new shaft into place until the end is flush with the outside wall of the insert.
4. Install a large O-ring near the top of the insert. Install a small O-ring near the paddlewheel.
5. Place the remaining two O-rings near the bottom of the blanking plug.

## Replacement Parts

Replace broken or worn parts immediately. Purchase parts from your Volvo Penta dealer.

**Part:** Paddlewheel Kit (PN 3588304)

# Notes

A series of 25 horizontal dotted lines for writing notes.



**VOLVO  
PENTA**

**Volvo Penta of the Americas**  
1300 Volvo Penta Drive  
Chesapeake, VA 23320-9810