
Installation Manual



HI-TEK
PRODUCTS OF AUSTRALIA

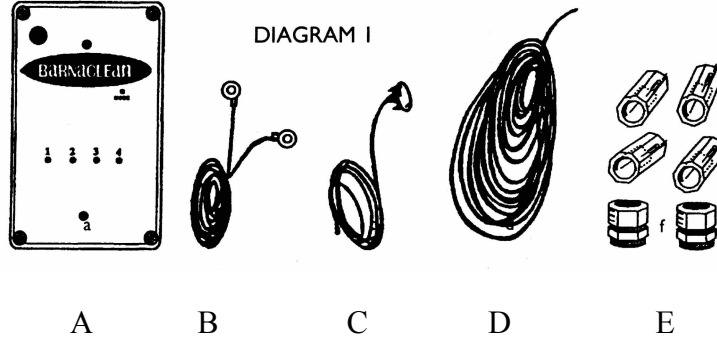
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SYSTEM KIT (Diagram 1)

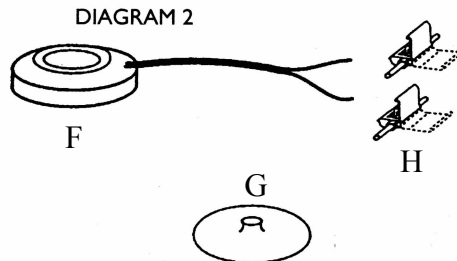
(Quantities will vary based on your custom configuration.)

Control Unit	A
20ft. (~6m) Battery Cable	B
20ft. (~6m) Switch Cable w/Sleep Mode Switch Attached	C
110ft. (~33.5m) Channel Wire	D
Package of Bolt Adapters, 2 Strain Reliefs, 4 Plastic caps (not shown), Rudderpost Adapters (not shown) and resonator studs (not shown).	E



RESONATOR KIT (Diagram 2)

1 Resonator w/connecting wires attached	F
1 Mounting Foot	G
2 3M Electrical T-taps	H



BEFORE YOU BEGIN

Congratulations on your Barnaclean™ purchase! In no time at all, you will begin to experience the benefits of sonic antifouling protection for your boat.

Installing Barnaclean™ is fairly simple and straightforward. However, before you begin, please take a moment to read through this brief manual. The few minutes you spend now will not only give you valuable insight into how Barnaclean™ works, but also save you time and possible miss-steps in the installation.

WHAT YOU'LL NEED

NOTE: Every effort is made to correctly pack and double-check each Barnaclean™ System. However, if you should find any items missing, simply call us and we'll get the missing parts to you immediately.

1. Your Barnaclean™ System (Check contents against List of Contents)
2. Pliers
3. Screwdrivers
4. A flexible putty knife (1/2" or 3/4").
5. A drill and 1/2" bit.
6. 80- or 100-grit sandpaper
7. Acetone solvent for cleaning.
8. A two-part marine epoxy adhesive, such as MarineTex, that dries to a very hard state. (Any brand of marine epoxy adhesive is satisfactory, as long as it has a thickened consistency for application with a putty knife and cures to a very hard state. Avoid any adhesive that is intended to remain "resilient".)
9. A tube of marine waterproof sealant. (Silicone or acrylic/silicone are recommended, as they are the easiest to apply and clean up.)
10. A small can or tube of liquid electrical tape. (This is optional with the new self-sealing electrical T-taps included in your Barnaclean™ kit, but is a good item to have around anytime when making electrical connections on a boat.)
11. Self-locking plastic cable ties.
12. Clean rags / paper towels and a plastic garbage bag for easy clean up.

A BRIEF DESCRIPTION OF BARNACLEAN'S™ OPERATION

Using a minuscule amount of electrical current from your boat's battery, the Barnaclean™ control unit sends pulsed signals to the resonators. The resonators, in turn, produce a low frequency, almost imperceptible vibration that discourages barnacles and other fouling animal organisms from attaching themselves to your boat's submerged hull and running gear. This vibration also creates a resonating boundary layer of water that surrounds your boat's hull and underwater appendages, and which works synergistically with algaecide bottom coatings to deter the build up of algae and grasses that interfere with the antifouling properties of such coatings.

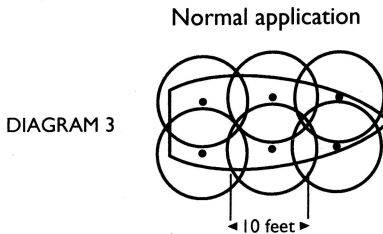
There are no through-hull fittings with Barnaclean™ . All fittings are installed inside the boat. And the installation can be accomplished with the boat in the water.

INSTALLATION

The following procedures have been developed to be simple and time-effective.

Step 1. Carefully plan where you'll be placing the resonators.

The chosen locations must ensure that the entire wet area of the hull at rest is covered by at least one resonator's ten-foot effective coverage diameter. It is important to arrange resonators so that their coverage areas overlap. This prevents voids in the coverage. (Refer to Diagram 3.) Remember, installing more than the minimum number of resonators is better than having too few.

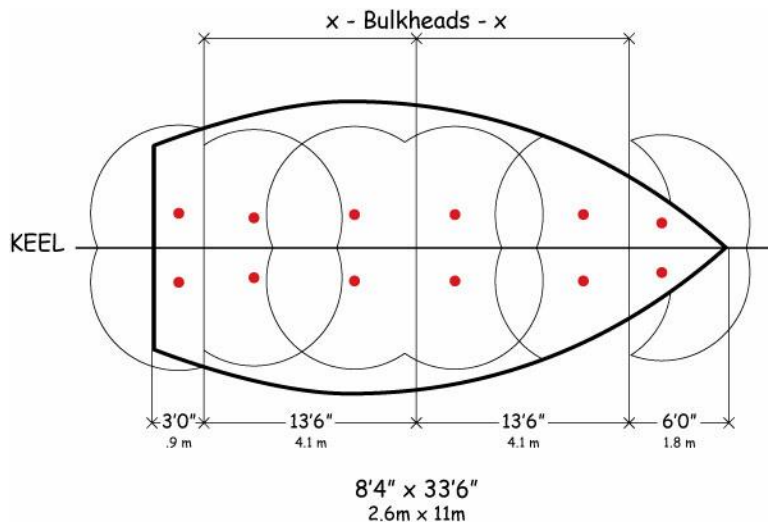


Begin your planning in the aft section of the boat. Place the first pair of resonators three feet (~.9m) forward of the transom and approximately 2 feet (~.6m) outboard of the centerline, one port and one starboard. Depending on bulkhead spacing, the second pair can be placed approximately 7.5 feet (~2.3m) forward of this first pair in the same relative positions, assuming no conflict with bulkheads. Proceed in this fashion until within 4 feet (~1.2m) of the bow

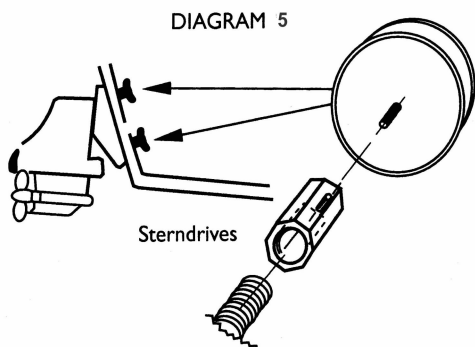
Structural bulkheads tend to dampen the resonance in the area of their connection to the hull. When planning resonator locations, it is best to assume that resonance will not be transmitted past a structural bulkhead. If the distance between bulkheads is less than 4 feet (~1.2m) try to position the resonators half way between the two bulkheads (i.e. if the first bulkhead forward of the transom is only 3 feet (~.9m), place the first 2 resonators (one port and one starboard) 1.5 feet (~.46m) forward of the transom. (Refer to Diagram 4.)

DIAGRAM 4

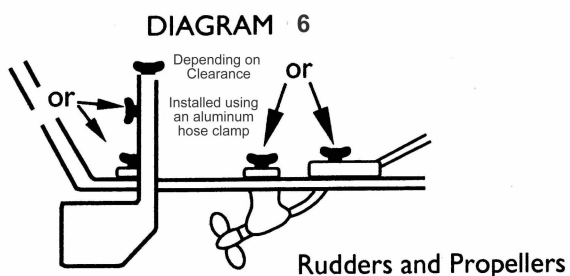
A typical layout considering bulkheads on a vessel with an 8' beam (~2.4m) and 34' LOA (~10m). Vessels with wider beams will require additional resonators.



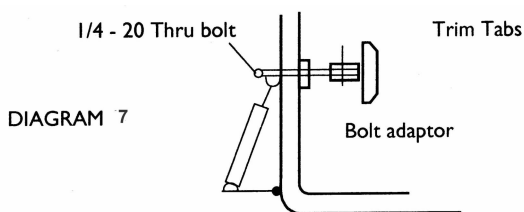
If you have a stern drive boat, keep in mind that two resonators are usually required for each drive leg. Thus, if you have a twin-screw stern drive boat, you must plan on allotting four resonators to protect the drive legs. (Refer to Diagram 5.)



Rudder, strut and shaft configurations vary considerably from boat to boat. Some typical placements for resonators are shown here. (Refer to Diagram 6.) If in doubt, check with us by calling our assistance hotline.



For trim tab coverage it is best to install one through bolt (1/4-20) at the upper end of the trim tab. (Refer to Diagram 7) This through bolt can be used in conjunction with a bolt adaptor to connect a resonator. If it is not possible to install a through bolt as described above, the next best solution is to epoxy the resonator onto the transom just opposite the upper trim tab connecting point.



Step 2. Choose a location for the control unit and the sleep mode switch.

Keep in mind that, if possible, the electrical supply cable for the control unit should be run directly to the battery, or if that is not possible, to a bilge pump circuit that is never shut off. (This is to avoid accidental shut-off when leaving the boat unattended).

The control box has numerous knockout fittings to allow attachment of the strain reliefs for the wire penetration through the box sides. It is recommended that the rear holes in the side be used to allow better attachment of the strain reliefs and the face plate.

Remember, as well, that the channel wire must run from the control unit to the resonators, and that the sleep mode switch cable must also be connected to the control unit. (A typical system layout is shown in Diagram 8.) As depicted in Diagram 8, the resonators are connected in parallel, not series.

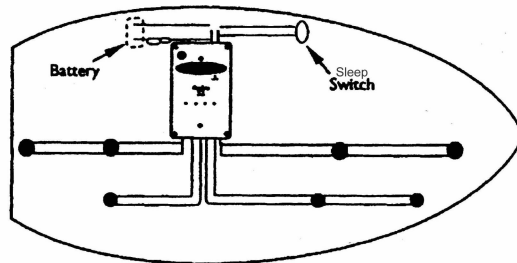
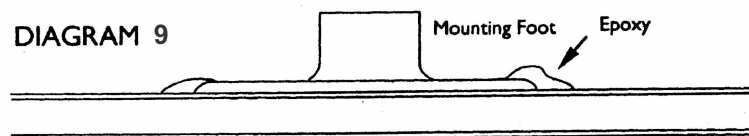


DIAGRAM 8

Step 3. Install the resonator mounting feet to the inside of the hull at selected sites.

First clean the surface at the selected site with solvent. Then sand lightly to rough up the surface providing a grip for improved bonding of the epoxy adhesive. Then clean again. If the surface is painted, sand through the paint to bare fiberglass or metal for better adhesion.

Apply a quantity of well-mixed epoxy adhesive to both the hull surface and the mating surface of the mounting foot. Place the mounting foot into position, using a twisting motion that will seat the foot well. Some epoxy adhesive should ooze out around the perimeter of the foot. With a finger wrapped in a rag or paper towel, smooth this excess into a fillet. (Refer to diagram 9.)



IMPORTANT NOTE: Do not install any of the resonators at this point. You must wait until the epoxy adhesive has set firmly.

Step 4. While the epoxy adhesive on the mounting feet is curing, install the control unit at the desired location.

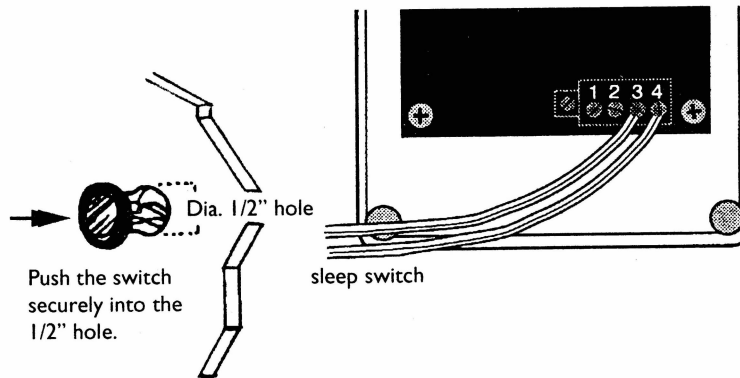
Four knock out fittings are provided on the control unit housing for screw mounting. Remember the rear set of holes in the sides provide a better fit of the components. After installing the screws, use plastic caps provided to plug screw mounting holes in the controller making them water tight.

Although the control unit is shock-resistant and watertight, and its connection terminals are the best in corrosion resistance, prudent practice is to locate the unit where it will be sheltered from rain and spray. As an additional precaution, you may elect to put a coating of silicone sealant or liquid vinyl over the terminals once the connections have been made.

Step 5. Install the sleep mode switch and connect to the control unit.

To install the switch, drill a 1/2" hole at the chosen location. Feed the switch cable through the hole, and press the switch body firmly into place. Run the switch cable to the control unit, strip the ends back 1/4" and insert into terminals 3 and 4 (on the small terminal block 1-4.) In this case, polarity is of no consequence. (Refer to diagram 10.)

DIAGRAM 10



Step 6. Run the appropriate amount of channel wire from the control unit to the resonator sites.

At this point you can connect the channel wire to the control unit; but do not attempt to connect the resonators yet. The control unit automatically adjusts to the number of resonators and channels being used.

The only limitation is that no more than eight resonators be connected to any one channel. And with four channels available, the maximum number of resonators is 32. If your boat is large enough to require more than 32 resonators for full coverage, you will need a second control unit.

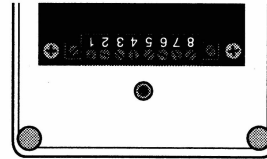
The channel wire must penetrate the control box wall utilizing the provided strain relief. They are installed as follows:

The cable connections in the control box are made by installing water tight strain reliefs into the non-threaded holes. Once the cord grip is mounted, using the seal and lock nut, insert cables and tighten pressure nut. Tighten nut to a torque of 5.0 inch pounds.

The terminal connections are now located inside the covered control box, as is the fuse. A diagram of the large terminal is provided (Diagram 11). Cables are to be installed as follows:

- On the large terminal block 1 - 8,
1. Terminals 1 & 2 are for Channel 4
 2. Terminals 3 & 4 are for Channel 3
 3. Terminals 5 & 6 are for Channel 2
 4. Terminals 7 & 8 are for Channel 1

DIAGRAM 11

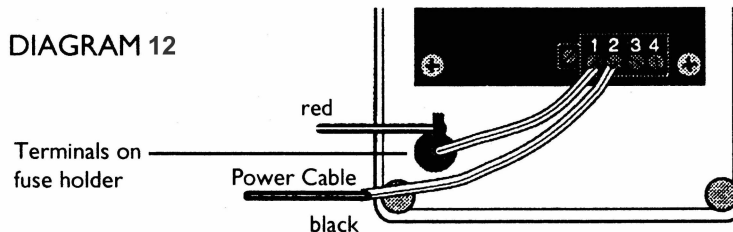


CAUTION: Remove the fuse from the fuse holder. Do not re-install until after step nine.

Connect power cable to small terminal block (Polarity is important). See Diagram 12 below.

1. Connect black lead of power cable to Terminal #2 position on the small terminal block.
2. Connect red lead of power cable to fuse terminal.
3. Connect the other wire from the fuse terminal to terminal #1 on the small terminal block, normally this will be factory installed. Make sure the sleep switch is connected to the small terminal block in terminal positions #3 and #4 (polarity is not important).

DIAGRAM 12

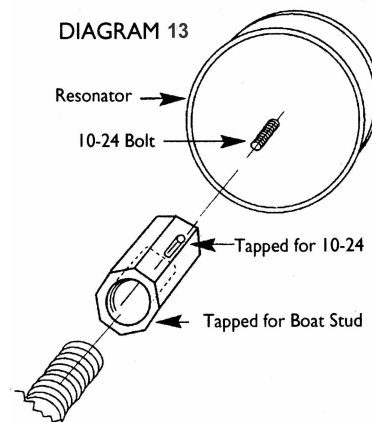


Step 7. When the epoxy adhesive on the resonator mounting feet has set, screw the resonator bodies into their respective mounting feet.

In the case of resonators for struts and other underwater appendages, use the special bolt adapters provided where appropriate, instead of the plastic mounting feet. (Refer to diagram 13.)

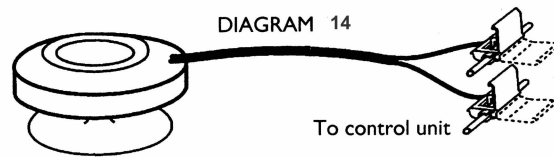
IMPORTANT NOTE: The correct degree of tightness is essential. Be careful not to over tighten the resonator. Remember “snug” is sufficient. Due to the difference in diameter of the resonator compared to the 10-24 brass mounting stud, it is relatively easy to over tighten by hand. If you over tighten, you will either strip the threads in the mounting foot or on the 10-24 brass mounting stud.

DIAGRAM 13



Step 8. Using the T-taps, connect the resonator wires to the appropriate conductor wires.

The connections are made as follows: (Refer to diagram 14)



IMPORTANT NOTE: T-Connecters must be completely open (Both the top and the back) to make the connection without cutting the wires from the control unit.

T-tap Instructions:

CAUTION: The Electrical T-taps contain a sealant that is a mineral oil base dielectric grease. It may cause skin and eye irritation. In case of direct contact, flush skin and eyes with plenty of water and call a physician.

1. Make sure power is off.
2. Open hinged side wall of tap by pulling on the t-tap lid.
3. Place unstripped channel run wire (pre-run) in slot and close hinged side wall.
4. Insert unstripped resonator wire completely into tap port. Make sure black wire is connected to one channel wire and red wires are connected to the other channel wire. Note: Again remember the resonators are connected in parallel, not in series. (if wire tips are stripped cut the stripped end off.)
5. Hold pliers perpendicular to the wire and make the connection by crimping the u-contact down flush with the top of the insulator.
6. Close cover until securely latched.

The 3-M t-taps are self-sealing, but you may choose to seal the resonator connections with liquid vinyl as a added precaution.

Secure the channel wire and resonator wiring with plastic wire ties either to pre-existing electrical cables and/or to the boat's structure, so that there are no loose loops of wire to trip on or otherwise cause trouble.

Step 9. Remove the 4-amp fuse from the fuse holder in the controller box. Route the battery cable as previously planned.

Connect the cable first to the control unit, then to the battery, being careful to observe the correct polarity at the feed end of the cable (See step 6). The cable is color-coded as an aid. Red is for positive (+) and black for negative (-).

The cable connections in the control box are made by installing water tight strain reliefs into the non-threaded holes. Once the cord grip is mounted, using the seal and lock nut, insert the cables and tighten pressure nut. Tighten nut to a torque of 5.0 inch pounds.

IMPORTANT NOTE: Although the control unit is reverse-polarity protected, the system will not function properly unless the correct polarity is observed. Check and double check this during installation.

Step 10. Re-install the fuse into the Controller Box fuse holder.

Then sit back, put your feet up, and enjoy. Barnaclean™ is on the job protecting your hull and running gear from fouling, 24 hours a day, 365 days a year.

IMPORTANT NOTE: You should perform a post-installation operation check. (See Operation Check and Troubleshooting on page 12.) If you encounter any problems that you cannot solve, call our toll-free assist line.

IMPORTANT NOTE: We recommend labeling resonators in high traffic areas so that those unfamiliar with the Barnaclean™ System won't inadvertently damage units by stepping on them.

OPERATION CHECK

When your Barnaclean™ system is operating normally, the four channels pulse in sequence, one after another in rotation. Each channel pulses approximately every 3.5 seconds. Check that each resonator produces a short chirp about every 3.5 seconds.

Condition	Explanation / Action
1. Green and red lights are off.	There is no power to the control unit. Check the power supply, in-line fuse in fuse holder, wiring and connections. Ensure battery is providing at least 12.5 VDC
2. Red channel lights are flashing slowly (cycling).	Power is being correctly supplied to the system. Red lights will flash slowly (cycle) when the channel is <u>not</u> being used or when there is a resonator connection problem. Check wiring and connections.
3. Green mode light flashes.	Indicates activity on a channel.
4. Red channel lights are off—no flashing.	Indicates activity on the channel and the channel is functioning properly. Resonators on that channel will be chirping. The green mode light will also be flashing.
5. Green mode light glows constantly.	Indicates that Barnaclean™ is in sleep mode.

TROUBLESHOOTING

Condition	Explanation / Action
1. No resonators, on any channel, are chirping and green mode light and red lights are off.	There is no power to the control unit. Check the power supply. Disconnect in-line fuse for at least 30 seconds, then reconnect. Check fuse condition. Check battery condition. Ensure battery is providing at least 12.5 VDC. Check that battery cable is connected correctly to the right control unit terminals.
2. No resonators, on any channel are chirping and red lights are flashing.	Check the channel wire to be sure it is properly connected to the terminal block and all resonators are properly connected to the channel wire.
3. One or more (but not all) red channel lights are flashing.	Check the channel wire connections on the flashing red light channels to be sure it is properly connected.
4. A resonator is not vibrating.	Check for proper seating of T-taps. If the metal U is not completely pressed down it will not have a good connection. Also check the resonator connections. To be sure the red and black wires are properly seated.

OPERATING INSTRUCTIONS

Barnaclean™ operates automatically when powered up. Each resonator should emit a short chirp about every 3.5 seconds. If not, refer to Operation Check on page 14.

Sleep mode turns the system off for a specific length of time when you press the sleep mode switch. Pressing the switch multiple times within a ten second period extends the length of the unit's nap.

One press, Barnaclean™ naps for 4 hours.

Two presses, Barnaclean™ naps for 8 hours

Three presses (max.), Barnaclean™ naps for 12 hours.

The green mode light on the control unit will glow constantly during sleep mode.

At the end of the sleep period, Barnaclean™ automatically reactivates itself, thus ensuring the boat is never inadvertently left unprotected.

IMPORTANT NOTE: Research has shown that Barnaclean™ protection should be active for minimum 12 hours per day. Accordingly, the system cannot be commanded to sleep for more than 12 hours at a time.

MAINTENANCE

Barnaclean™ is maintenance free. You should, however, keep a normal, regular check on your battery to ensure a constant power supply, greater than 12.5 VDC, to the Barnaclean™ unit. Your Barnaclean™ terminals and connections should be checked for tightness and possible corrosion as part of your normal electrical system checking routine. As well, although malfunction of the resonator units are very rare, a similar period check to see that all are chirping correctly is prudent. At the time you check the resonators for operation it would also be prudent to spray the resonator with something like Corrosive Block or WD-40 to maintain a thorough corrosion boundary.

THANK YOU FOR CHOOSING BARNACLEAN!