

# **RARITAN**

## **Compact, PH, PHE Heads and Electric Drive Unit INSTALLATION AND MAINTENANCE INSTRUCTIONS Parts and Exchange Unit Lists**

Raritan Engineering Company was the first to recognize that traditional designs of all-metal marine heads were chronically plagued by corrosion, valve and seal problems that could be eliminated by modern design and materials. In 1960 Raritan introduced the first "PH" (Plastic Housing pump and base) toilets with china bowls in the industry. These heads, due to their revolutionary design and materials, give years of trouble-free service when properly installed. This folder will help you achieve this built-in reliability.

### **DESCRIPTION**

The "COMPACT" is the smallest toilet in the line. It is available in four different configurations, all readily convertible in the field for right or left hand (pump) installation. As assembled in the factory, a right hand unit has the pump and handle, on the right as the viewer faces it.

The "REGULAR" Compact has the pump mounted vertically and it is flushed by moving the knob straight up and down. The "V" BASE COMPACT has the same pump assembly as the REGULAR COMPACT but it is mounted on an inclined base to minimize space requirements and interference with hull obstructions. In extremely close quarters, the pump handle can be installed in front of the bowl as well as on either side.

Both the "REGULAR" and the "V" BASE COMPACTS are available with standard marine size seats and lids, or the extra low profile "LOW-BOY" bowl with the seat molded integrally with the china bowl. This eliminates the extra height required by a seat and lid. "LOWBOYS" are generally installed under a bunk or seat on small boats; in the forepeak on larger craft.

The "PH" head is larger than the "COMPACTS" and is generally used where space limitations permit. The "PHE" is the electric powered version of the "PH" and can be converted to hand operation by merely disconnecting the link between piston rod and motor crank. A "PH" can be converted to a "PHE" by adding the "ELECTRIC DRIVE CONVERSION KIT". Holes are pre-drilled in the "PH" at the factory to accommodate this unit.

"PH" and "PHE" models can be supplied with the "LOW-BOY" bowl, replacing the standard marine-size bowl and seat. A "HOUSEHOLD-SIZE" bowl and seat ("HIGH-BOY") can also be used. The large size bowls can be furnished in decorator colors - cool blue and soft yellow with seats and lids to match, as well as the traditional white.

## INSTALLATION

### SPACE REQUIREMENTS TABLE

MODEL	HEIGHT	DEPTH	WIDTH
PH With Seat and Lid	14 1/4"	17 1/4"	18"
PH - Seat Only Household Size	13"	17 1/4"	18"
PH With Seat and Lid	14 3/4"	21"	18 1/2"
Low--Boy PH Without Seat and Lid	10 3/4"	16 3/4"	17 1/4"
Standard Compact With Seat and Lid	13 5/8"	17 1/4"	17 3/4"
Standard Compact Seat Only	12 1/2"	17 1/4"	17 3/4"
Low-Boy With Seat and Lid	12 1/4"	17 1/4"	16"
Low--Boy without Seat and Lid	10"	17 1/4"	16"

MODEL PHE ELECTRIC TOILET has same dimensions as its PH counterparts.

“V” BASE LOW-BOY TOILET has same overall dimensions as its Low-Boy counterparts, except base is narrower

"COMPACT" and "PH" and "PHE" heads can be mounted above or below the water line. They are equally suitable for use with a holding tank, recirculating system, or a flow-through sewage treatment device such as a chlorinator. The use of a vented loop or "swans neck" on the discharge is common practice, especially in sail boats.

All through-the-hull fitting installations should include an accessible sea cock for safety and to simplify maintenance. This is a marine underwriters requirement if the installation is made at or near the water line.

Use a good grade of 3/4" I.D. hose for the inlet connection and 1 1/2" I.D. hose of similar quality for the outlet connection. A strainer, such as the Raritan Raw Water Strainer, should be installed in the inlet line.

Both inlet and outlet through-the-hull fittings should be as far apart as practicable; preferably located on opposite sides of the keel to avoid the possibility of the discharge being drawn back into the inlet. Through-the-hull fittings can be located near the water line or down near the keel without affecting flushing action.

Major dimensions of all the various models are shown in the Space Requirements Table. Mount the unit on a flat solid deck, securely, using through bolts backed up with nuts and large washers or lag screws long enough so they will not pull out.

### **PHE SWITCH, WIRE SIZES, FUSES OR CIRCUIT BREAKERS**

The "PHE" operating switch should be a momentary type permitting the motor to run only while the contact is held. Unless a heavy duty relay of the type commonly employed for engine

starting is used, we recommend the moisture proof Raritan "Hi-Amp" switch for this purpose. It is available from Raritan Dealers and Service Stations or direct from the factory. On 115 Volt DC units, we recommend a relay specifically rated for DC.

It is a false economy to use wire too small in gauge. Under-capacity wire sizes and fuses cause poor performance, especially in 12-Volt units. For best results, use the sizes specified in the table below. In computing "distance from batteries" the total footage of all wiring from the batteries to the head *and back to the batteries*, including the switch, should be used. If a relay is used to supplement the switch, the length of wire between the relay and the switch need not be considered.

### RECOMMENDED MINIMUM SIZES OF WIRE & FUSES

	12VDC	32VDC	115VAC DC
If distance from batteries is less than 15 ft., use wire not less than	10 gauge	14 gauge	16 gauge
If distance from batteries is more than 15 ft., use wire not less than	8 gauge	12 gauge	16 gauge
Fuses (or circuit breakers)	25 Amps.	12 Amps.	5 Amps.

Locate fuses for easy accessibility. The frame of the motor is insulated so either polarity to the two motor leads will not cause a short circuit. We recommend grounding the motor or gear box body just as other major equipment should be grounded.

**IMPORTANT:** The PHE should have its own separate circuit through its own fuse or circuit breakers all the way back to the main power terminals. Do not use or break into other circuits when wiring this unit. Do not wire a chlorinator into the PHE circuit.

### OPERATING CYCLE

Pushing the handle or knob down on the "Compact" or PH (and PHE when operated manually,) draws sea water past the inlet check valve into the top portion of the pump cylinder. In the "Compact", shut off valve handle (Part #1305B) must be in the horizontal position. In the PH, valve handle (Part # 1 209) must be in the UP (turn anti-clockwise) position. On the up stroke of the handle, the inlet valve (Part # 13 1 0 on Compact and #1201 on PH) closes and water is forced through the outlet valve opposite. Subsequent strokes of the handle pump water through the hose connecting the pump housing and the spud at the rear of the bowl. Water washes down the sides of the bowl through the annular water passage in the rim of the bowl and drain holes on the rim's underside.

It is advisable to flush the toilet briefly before use. This wets the sides of the bowl and minimizes staining. As sea water is drawn into and expelled from the upper side of the piston in the pump housing, waste and waste water is drawn out of the bowl at the bottom past the flapper valve and joker valve and expelled overboard. There is no chance for waste to be re-

circulated unless the inlet and outlet through-the-hull fittings are located too close to each other.

Both the "Compact" and the "PH" are designed to pump out faster than they pump in. If the water level in the bowl rises instead of recedes, it is due to trash momentarily lodged under the outlet flapper valve (Part # 1330 or #1228 in the PH). The trash can be cleared by partially or completely closing the inlet valve and continuing to pump. A degree of resistance will be noted in pumping which is normal. After the bowl is cleared of all debris, open the valve again and flush a few strokes to clear the discharge lines.

### **OPERATING NOTES**

**DO NOT** tighten screws (Part #1331 or #1226) more than enough to prevent leakage. Over tightening them will stretch the hinge of the flapper valve, causing flow back.

**DO NOT** throw hard or stringy substances down the toilet. such as "Wet Strength" paper towels, sanitary napkins, etc.. Ordinary cigarette butts are easily flushed but filter tip cigarettes (especially those with plastic inserts) and cigars with plastic mouth pieces must not be thrown down the toilet.

**DO NOT** attempt to flush bobby pins or other hard objects. They **MUST** be fished out to prevent damage to or the toilet mechanism.

**DO NOT** pour "Pine Oil" or other kerosene-like solvents down the toilet; it will damage and swell rubber parts.

**DO NOT** hook up a chlorinator to the same circuit as the PHE.

**DO NOT** attempt repairs until you have thoroughly studied the instruction manual and parts list-. especially the portion headed "TROUBLE SHOOTING".

**DO NOT** attempt any repairs until checking the terms of our warranty and factory exchange policy.

**DO NOT** neglect to make sure that the cotter-pin #1210A is in place and that it engages the hole in the handle #1206 ("PH" only).

**DO NOT** neglect to fill in and return our Guarantee Card.

**DO NOT** winterize with alcohol or kerosene. See instructions under "STORAGE".

## MAINTENANCE

Very little maintenance is required. Ordinary scouring powders such as "Ajax" will keep the bowl clean. The pure white finish is molded-in; no painting is ever required. If for any reason a deodorizer is indicated, use "Clorox" rather than solvents such as "Pine Oil" or "Lysol". A little vaseline applied to the piston rod, especially to the "PHE" will prolong the life of "U" cup seals and gland. A few drops of oil on both ends of the connecting rod of the PHE in fall and spring is recommended. It should never be necessary to add grease to the PHE gear box.

## STORAGE AND COMMISSIONING

Improper winter lay-up is the major cause of all marine toilet failures. For winter lay-up, there are six simple but vitally important steps to follow:

1. Close inlet sea cock. Remove inlet hose from pump housing and temporarily attach a short length of hose to the inlet.
2. Pour about one quart of "permanent type" anti-freeze (do not use anti-leak types) into a coffee can or other container. With the open end of the temporary hose in the container, pump the head until the color of the fluid running down from the rim of the bowl indicates the anti-freeze has circulated and is being discharged through the outlet sea cock.
3. Close the outlet sea cock.
4. Let the anti-freeze remain in the toilet until the boat is re-commissioned.  
This method of winterizing protects both the inlet side of the pump and the discharge areas. Simply pouring anti-freeze into the bowl protects only the discharge side. *This is why so many marine toilets give trouble iii the springtime.*
5. When danger of freezing is past, reconnect the inlet hose and open both sea cocks.
6. Apply a little vaseline to the piston rod.

## TROUBLE SHOOTING

NOTE: It is wise to carry on board a Raritan head repair kit for the model you have. These kits provide all the parts you are apt to use for normal servicing.

**Problem: Water accumulates in the bowl faster than it pumps out.**

**CAUSE:** First, clear any lodged trash by the procedure listed in the "Operating Cycle". If the problem persists, the flapper valve in discharge is not seating. It could be squeezed too tight, stretching the hinge. Or, it could be swollen due to use of certain deodorants.

**CURE:** Replace flapper valve. Tighten screws only enough to preclude leaking over tightening will stretch hinge and prevent proper seating.

**Problem:** Water rises in bowl when boat is dockside. Rim of bowl is below water line of boat.

**CAUSE:** Either outlet joker valve is leaking or inlet check

**CURE:** Close first one sea cock then the other to determine whether water comes in outlet or inlet. If outlet leaks, replace joker valve.

**NOTE:** It is a wise precaution to install a vented loop or "swans neck" in the discharge. This will prevent back siphoning through the discharge if either the joker valve or flapper leak.

If the water comes from the inlet, make sure there is no trash under the inlet check valve. In the "PH" models an additional stainless steel spring obtainable from Raritan at no charge is available for installations considerably below the water line. It is wise to close the inlet valves when the boat is left unattended.

**Problem:** Water fills up the bowl when the boat is under way.

**CAUSE:** This is more likely to happen when the head is located forward. Water pressure due to the speed of the boat unseats the ball check on the inlet (PH Model).

**CURE:** Raritan provides, on special order, a spring designed to eliminate this problem. As an alternative, as an alternative, a water scoop can be installed backwards on the outside of the hull over the inlet sea cock. This will deflect the water pressure. On the "Compact" model, the water scoop will cure the trouble. In any case, it is wise to at close the inlet valves when under way, especially in rough water.

**Problem:** Inlet water flow is poor and/or water builds up in bowl. Handle seems to work harder than it should. Trouble does not seem to be due to causes described above.

**CAUSE:** In certain areas such as Florida, concrete-like deposits build up in both the inlet and outlet connections and adversely affect all types of marine toilets. This appears to be a type of coral. The only cure is periodic cleaning done manually.

**Problem:** A persistent and obnoxious odor emanates from the bowl of the head.

**CAUSE:** Eel grass or other marine vegetation has worked its way through the pump and is lodged in the passage way that is molded in the rim of the bowl. Here it decays and gives off a "rotten egg" type smell. Perhaps you will note little black specks that look like crumbs of tobacco flowing down the sides of the bowl from the wash holes under the rim. The immediate cure is to connect a garden hose to the spud at the back of the bowl and flush it thoroughly under pressure. Another method is to disconnect the inlet hose and temporarily attach -another short hose so that the toilet can suck a strong solution of "Drano" from a bucket. To prevent recurrence, we advise installing a strainer on the inlet line.

Another remote possibility for this odor is that the inlet connection is on the same side of the boat as the discharge and so near it that some of the effluent is actually being drawn back into the inlet. In systems that due to stringent anti-pollution

laws use recirculating water, a deodorant as recommended by the manufacturer of the recirculating device *must* be used.

**Problem:**     **Changing the water height in the bowl. Some people prefer to have the bowl retain some water after flushing. Others prefer that practically all the water should be pumped out so that it will not slop and splash when heeled over in a seaway.**

As shipped from the factory, very little water will remain in the bowl under normal conditions. To retain water in the bowl, have your boat yard install a vented loop in the discharge hose.

**Problem:**     **On the ' PHE'' when operated electrically, the pump works very slowly and the motor labors.**

**CAUSE:**       This is due almost always to low voltage, especially in 12-Volt models. Check voltage with a meter by baring the wire close to the motor (2"). Voltage should not be less than 11.5 volts when the motor is running. Other voltages should not show more than a 10% drop. If voltage drop is excessive, check if wiring and fuses conform to those recommended in the table. Check operating switch for adequate capacity. For 12Volt models, switch should be rated for 30 amperes or more; 32-Volts and 115-Volts, require a switch rated for 10 amperes. Look for corroded connections, especially at fuse clips. See that piston rod is lubricated. Disconnect connecting rod and check if pump operates freely when hand pumped.

**Problem:**     **Water squirts up piston rod when pumped.**

**CAUSE:**       Seal leaking.

**CURE:** Replace seal, make sure retaining washer is re-placed evenly and just snug, not tight.

### **CONVERSION OF THE HAND TOILET TO ELECTRIC OPERATION**

Raritan PH hand toilets are designed for easy conversion to electric operation, using the Raritan Electric Conversion Kit. The conversion can be made in fifteen minutes by the average mechanic using basic tools. Fasten the electric drive unit to the drilled pad using the bolts and washers provided. Move the pump handle until the top of the arm aligns with the hole in the handle socket. Insert the arm bolt and tighten the nut. Remove the handle. Back-off the arm bolt if it binds. Lubricate moving parts with a few drops of oil.

## **SPARE PARTS AND EXCHANGE UNITS**

Repair parts and repair kits for all Raritan toilets are available from most authorized Raritan Service Stations or direct from the factory. Please order by part number, using the schemata, drawings for your model to identify the parts you need.

To simplify maintenance and reduce our costs, Raritan offers a plan by which factory re-manufactured exchange units are offered at reduced costs. To qualify for exchange, your toilet (less bowl and seat), or the Electric Drive unit is returned to a Raritan Service Center and the factory. You are given credit for the worn out unit if found to be free from damage by fire, freezing, excessive corrosion or abuse. An exchange price list with full details is available from the factory and most Raritan Service Centers.



## Parts For Raritan PH And PHE Marine Toilets

(Quantities are 1 unless otherwise noted)

PART NO.	PART NAME
1200	Housing
1201	Inlet Valve Ball
1202	Inlet Valve Gasket
1203	Inlet Valve Stem
1204	Valve Cap
1205	Valve Stem "O" Ring
1206	Handle, Standard
1207	Handle, Low-Boy
1208	Handle, High-Boy
1209	Valve Handle
1209A	Valve Handle Screw
1210	Handle Socket
1210A	Cotter Pin (4)
1211	Piston Rod Yoke
1212	Piston Rod Assembly
1213	Piston Rod "O" Ring
1213A	"U" Cup
1213B	Delrin Washer
1213C	Snap Ring
1213D	White Washer (Neoprene)
1214	Piston Rod Shaft Nut
1214A	Piston Nut Gasket
1215	Piston Rod Shaft Bearing (2)
1216	Clevis Pin (3)
1217	Valve Cap
1218	Fulcrum Link (2)
1220	Valve Gasket
1221	Outlet Valve Ball
1222A	90° Discharge
1222B	Straight Discharge
1222C	45° Discharge
1223	Flange Bolt and Nut (2)
1224	Joker Valve
1225	Flange
1226	Housing Bolt and Nuts (4)
1227	Base Plug
1228	Flapper Valve
1229	Vent
1230	Vent Joker Valve
1231	Vent Gasket
1232	Piston "O" Ring
1234	Bowl Gasket
1235	Base
1236	Bowl Elbow
1239	Bowl Bolt Washer (4)
1240	Bowl Bolt Rubber Washer (4)
1241	Bowl Bolt and Nut (4)
1242	Hose Clamp (2)
1243	Hose

### BOWL AND SEAT

1237	Standard Bowl
1237A	Low-Boy Bowl
1238A	Seat and Cover
1238B	Seat Only
1244	High-Boy Bowl
1245	Seat and Cover

### RARITAN REPAIR KITS FOR MODELS PH and PHE TOILETS

Contain the parts normally required to repair and maintain a PH or PHE toilet. Save you time and money.

