

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

# LECTRA/SAN®

## MARINE *flow-thru* WASTE TREATMENT SYSTEM



**U.S. COAST GUARD CERTIFIED TYPE I MSD**

**- IMPORTANT -**

Read manual before proceeding with installation or operation of system.

### I. DESCRIPTION

LECTRA/SAN® is a U.S.C.G. Certified Type I Marine Sanitation Device (MSD). The unit is available in 12, 24 and 32 volt DC models. (U.S.C.G. Certification 159.15/1001/3/1, 159.15/1001/5/1 for pleasure craft\* under 65' in length.)

LECTRA/SAN provides flow-thru treatment of wastewater from a marine toilet by maceration and chlorination. The treatment process destroys bacteria and odors, reduces solids and lowers the biochemical oxygen demand (BOD) of the wastewater. The disinfecting agent, hypochlorous acid, is produced during the treatment cycle by electrolyzing seawater used to flush the toilet. In brackish or fresh water, a salt solution is automatically metered into the flush water.

The LECTRA/SAN system is activated by turning a knob on the control unit just before flushing the marine toilet. The flush water from the toilet enters the flooded treatment chamber and displaces an equal volume of treated waste for overboard discharge through a seacock. The toilet serves as the pump for the treatment system; it must be powerful enough to

\*LECTRA/SAN® MSD's have been accepted for use on commercial vessels under certain conditions. Contact Raritan Engineering Co., Inc. for further information.

LECTRA/SAN® is a registered trademark of ELTECH SYSTEMS, Chardon, OH, patented under U.S. 3,856,642.

move waste through the system, but not too powerful so as to overwhelm the system. The treatment tank holds about four flushes; therefore, waste is treated four times before discharge. A complete description of the LECTRA/SAN operation is given in Section VI.

### II. SYSTEM COMPONENTS

**1. Treatment Unit** - A partition containing the electrode pack divides the treatment tank; electrodes project into each of the two chambers. The first chamber houses the macerator which reduces sewage to tiny particles. The electrodes produce hypochlorous acid, a powerful bactericide, from the salt in the water, treating and disinfecting the macerated sewage. Subsequent flushes of the toilet push macerated and partially treated sewage through a cross-over pipe into the second chamber, retaining large particles in the macerator chamber for further size reduction. In the second chamber waste receives further treatment and mixing. Additional flushes of the toilet push treated waste overboard. When used properly (cycled each time the toilet is flushed), no sludge will accumulate in either chamber.

**2. Control Unit\*** - The control unit contains timing mechanism, relay and fuses for automatic treatment cycle. Operating lights indicate when the unit is

operating in Flush/Pretreat and Treatment portions of the cycle. A meter indicates whether the electrode pack is operating in a low, normal or high range, and thus serves as an indirect indicator of the degree of treatment attained.

**3. Salt Feed Unit** - A solution of ordinary table salt is stored in the two gallon salt feed tank. This salt solution is metered into brackish or fresh flush water through a specially designed metering valve, called a "T" Check Valve. If seawater is used for flushing, the salt addition is not required. An alternate method of adding salt to the flush water is to manually pour about 1 3/4 oz. of granular table salt into the toilet prior to flushing. This method is often preferred when the boat only occasionally cruises into brackish or fresh water; in these cases the owners do not install the salt feed tank or the "T" Check Valve.

### III. INSTALLATION

See Section X, Materials Required, for a list of items needed to mount and wire the LECTRA/SAN.

#### A. MOUNTING

**1. Treatment Unit** - The LECTRA/SAN treatment unit, for most efficient operation, should be mounted within three feet of the toilet, and with the treatment discharge elbow lower than the toilet discharge fitting. If the treatment unit is on the same level as, or higher than the toilet's discharge fitting, flushing efficiency of the toilet may be reduced.

Build a solid support with side flanges to nest the treatment unit, a rubber pad placed under the unit will reduce vibration and operating noise, see Fig. 1.

Prepare screw-in fittings with nonhardening pipe joint compound. Intake openings are provided on either side of treatment unit; use the more convenient opening and plug the other with the threaded plug supplied. Connect to the toilet with 1 1/2" ID laminated rubber hose having a smooth interior or, where possible, with PVC piping. Do not use metal pipe. If sharp bends are necessary in plumbing the unit, use standard auto radiator hoses, available with premolded curves. Do not use "flexible" hoses with annular grooves on the inside; the inside of the hose must be smooth.

\* In some cases where two separate toilets are located within a few feet of each other two specially manufactured control units may be used with a single Treatment Unit. Contact Raritan Engineering Co., Inc. for information on "Dual Control" LECTRA/SAN® units.

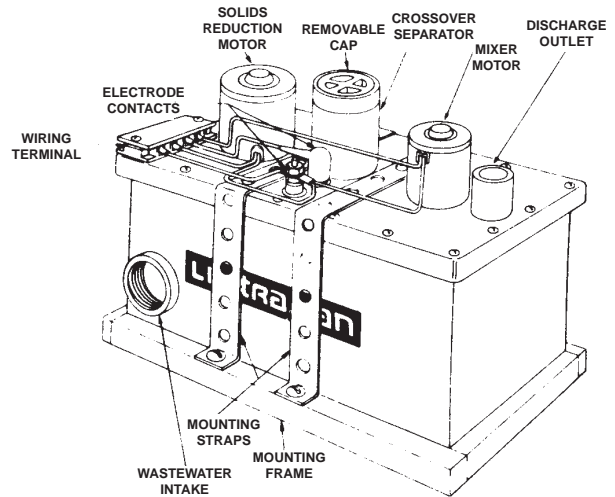


Fig. 1 Treatment Unit Mounting

Work from the seacock toward the treatment unit when connecting the discharge from the LECTRA/SAN. Using stainless steel hose clamps or equivalent, double clamp joints below the waterline where possible, for safety. Screw the barbed hose fitting into discharge elbow. When it is determined which way discharge elbow should point, apply PVC cement to the inside of the elbow and press elbow firmly over the neck located on top of the treatment unit. Allow at least an hour for the cement to set before connecting or clamping the discharge hose, see Sect. V.

If the treatment unit and/or the midpoint of the toilet's bowl is at or below the boat's waterline when the boat is upright, or in a sail boat when heeled, install a vented loop between the treatment unit and the thru-hull fitting, see Fig. 2a.

The loop must be vented outboard of the hull through a 1/4" or larger I.D. hose. **DO NOT** vent it to the interior of the boat (including engine room), to prevent odors. The top of the loop should be at least 4" above the waterline with the boat at rest (or 4" above the waterline on a sailboat at full heel).

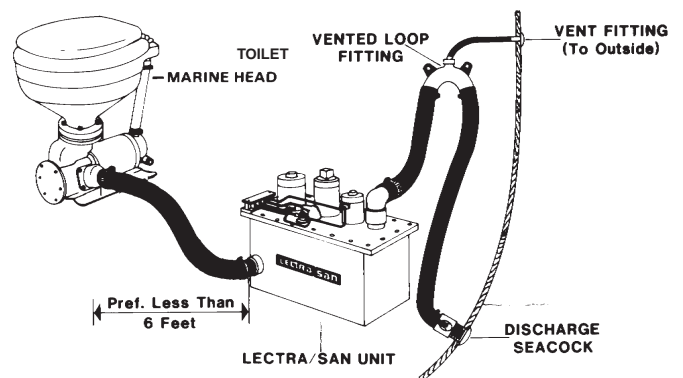
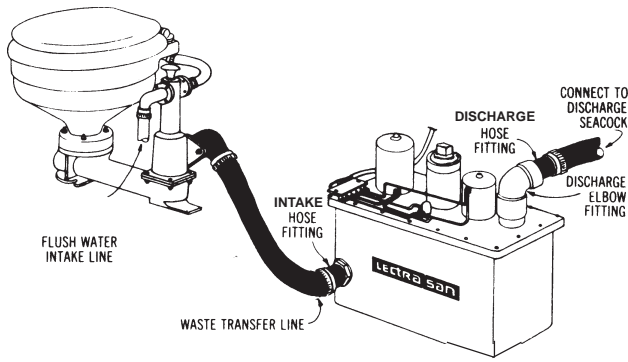


Fig. 2a Installation With Crown Head - With Optional Vent Loop



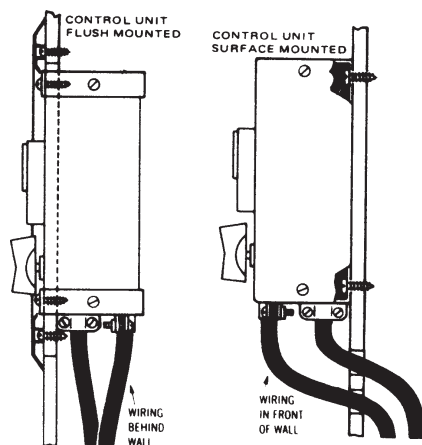
**Fig. 2a Installation With Manual Pump Toilet**

**2. Control Unit** - Note red and blue printed warning label included in literature pack. If control unit is to be surface mounted, install label on the face of control unit directly above the indicator meter. If control unit is to be flush mounted using faceplate, install the label at the top of the faceplate.

**a. Surface Mounting** - Remove screws from the sides of the control unit and separate into two sections. Secure the back of the box to the wall with the four # 10 screws supplied. Replace the front half of the control unit onto the wall-mounted back of the box. Replace screws in the box but do not tighten completely. Two 9/16" holes are then drilled in the wall about 3" below the bottom of the box to run supplied cable from the control unit to the Treatment Unit, and a field-supplied cable from the control unit to the power source. Remove front half of the control unit, then refer to Sect. III., B.

**b. Flush Mounting** - Remove screws from the sides of the control unit. Attach two mounting brackets to the box and secure by replacing the screws. Cut a hole for the control unit using the supplied template to mark the opening. Trial mount and align the control unit in the opening, then secure control unit in position using the (4) #10 screws supplied. Remove control unit from wall, take off mounting brackets and remove rear cover from control unit.

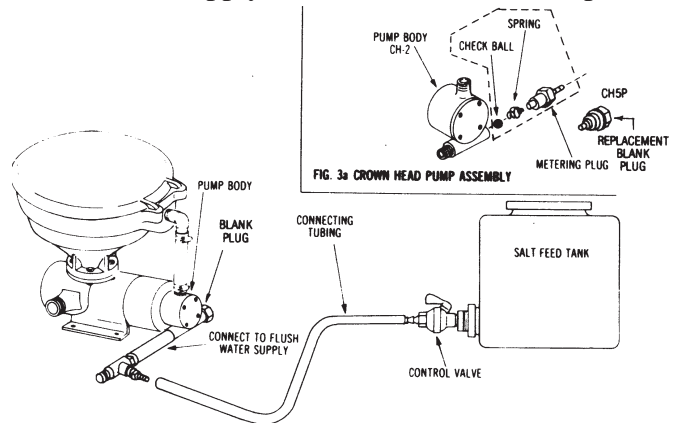
Wire control unit in accordance with instructions in Section III., B. Reassemble control unit after wiring, replace mounting brackets and mount control unit in wall opening.



Position and align the faceplate on the control unit and fasten with (4) #12 screws supplied.

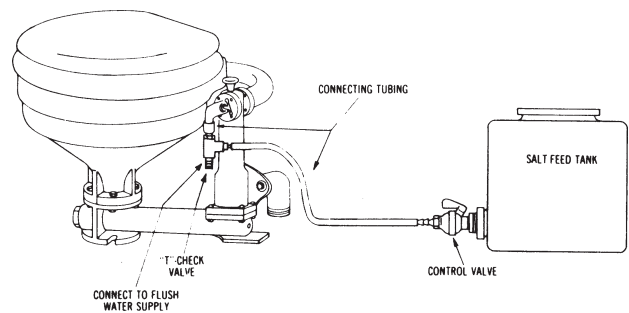
**3. Salt Feed Unit** - Assemble the Salt Feed Unit (see Fig. 11). Use a sealant, such as Silicone cement, to seal between tank adapter (Item 3, Fig. 11) and salt feed tank (Item 1, Fig. 11). The sealant should also be put on the threads of the control valve (Item 4, Fig. 11). Locate the salt feed tank in an accessible areas where it can be refilled as needed. It should be mounted within six feet of the toilet with the top of the salt feed tank lower than the top of the toilet bowl. Secure it in place using a wooden frame or other means, taking care not to puncture the tank. Attach "T" Check valve and tubing to control valve as shown in Figs. 3 and 4. Cut off any excess tubing.

**Raritan Crown Head** - Fig. 3 shows the installation of the Salt Feed Unit with a Raritan Crown Head. Remove and discard the check ball and spring from the intake pump assembly (CH2 or CH2A). If the toilet is equipped with a metering plug, it must be replaced with a blank plug (CH5P), available from Raritan dealers or from the factory. Screw the blank plug into the pump, leaving out the check ball and spring. The "T" Check valve is then added in the intake water supply line as near the toilet as practi-



**Fig. 3 Crown Head Salt Feed System Installation**

Manual toilets including Raritan COMPACT, PH/PHII, PHE/PHEII models and most other manual flush toilets. For PHII/PHEII series toilets, remove intake ball (1201) and spring (LWS) before connecting the T-Check valve (see Fig. 4).



**Fig. 4 Manual Toilet Salt Feed System Installation**

cal, see Fig. 3. Be sure the arrow on the side of the "T" Check valve points toward the toilet. Secure the "T" Check valve with stainless steel hose clamps.

## B. Wiring

Use only stranded copper wire and solderless crimp-on connectors. Descriptions of wire and terminals are listed in Sect. X.

**WARNING: LECTRA/SAN units are manufactured for Negative Ground use only ; do not install with a Positive Ground electrical system.**

### 1. Control Unit

- a) Pass the end of the 4 conductor control cable containing the (3) captive-spade and the (1) ring connector through hole #1 of the Control Unit (see Fig. 5); do not tighten the strain-relief connector.

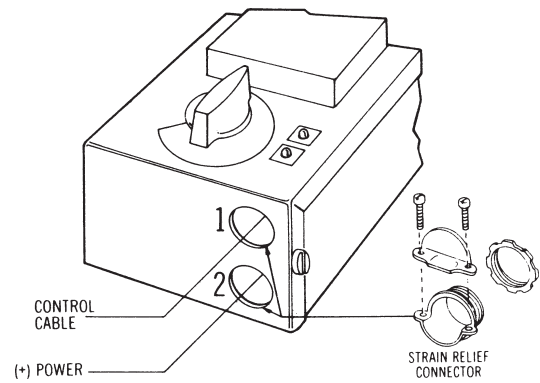
Secure the white wire of the control cable to the white terminal (A) on the fuse block, (see Fig. 6). Do likewise with the red wire (to terminal B) and the blue wire (to terminal C). Secure the black wire to terminal D of the relay. After all 4 wires are attached, secured and double-checked, tighten the strain-relief connector. Route the cable through walls, below deck, etc., to the treatment unit.

- b) Measure the distance between the Control Unit and the DC power source. 12 volt systems: Use #6 wire if length of wire needed is 10 feet or less. Use #4 wire if length is 10-25 feet and #2 wire if longer than 25 feet. 24 volt or 32 volt systems: Use #8, #6 and #4 wire, respectively.

Bare one end of wire and crimp on a solderless ring connector for a 5/16" stud.\* Pass the wire and connector through hole #2 (Fig. 5) in the Control Unit and connect to Lug E of the relay (Fig. 6). Tighten the strain relief connector. The other end of the wire is routed to the area of the battery(ies) or power source and prepared for connection to a 60 Amp (12 volt) or 50 Amp (24 & 32 volt) circuit breaker or fuse, available from Raritan dealers or from the factory. From the circuit breaker or fuse, the same gauge wire is used to connect to the power source (Fig. 6).

- c) Double-check polarity. Lug E on the relay in the Control Unit is Positive (+); Lug D is

\* Use a quality crimping tool (Multipurpose Tool, ABC-500;ETC. Inc. Cleveland, Ohio) or equivalent.



**Fig. 5 Control Unit Box**

Negative (-). Units damaged by reversed polarity are not covered by warranty.

- d) Check the alignment of all wires in the Control box. Make sure all wires are attached to the proper terminals and lugs, and all screws and nuts are tightened.
- e) Rejoin the two halves of the Control Unit and mount it on or in the wall as discussed earlier.

### 2. Treatment Unit

- a) Remove terminal block cover (31-132) and cable clamp (31-111). Run control cable through cable clamp, then connect to terminal block. When connecting to terminal block, note that white wire goes to terminal A, red wire to terminal B, blue wire to terminal C and black wire to terminal D (Fig. 6). If terminal ends are not already crimped onto cable, crimp supplied terminals onto cable, using a quality crimping tool (see earlier footnote). Reposition and secure cable clamp; replace terminal block cover. **NOTE: If control cable is too long (and terminals are not already crimped on), it may be cut, ends stripped and terminals crimped onto shortened cable. If terminals are already crimped onto cable, coil extra cable and secure it in an out-of-the-way area.**

- b) Connect ground (-) wire between the Treatment Unit and the battery negative post or main DC ground, whichever is shorter, following wire gauge recommendations for connecting main DC power feed to Control Unit (III., B., 1., b), earlier.

Bare ends of wire and crimp a solderless ring connector for a 1/4" stud onto one end. Attach the prepared end of the wire to (-) stud on top of Treatment Unit and tighten. There will now be four wires connected to this stud.

Prepare the other end of ground wire to be connected to the ground (-) connection. Attach and secure it to the main DC ground connection of the boat or to the battery (-) terminal.

c) Check routing of all wires and secure wiring to boat structure as required.

#### IV. CAUTIONARY INFORMATION

There are three basic areas where owner/operator care is required to insure consistent, reliable operation of the LECTRA/SAN SYSTEM:

##### 1. Understand the system and how it works.

Once the operator understands what the system does and how it's accomplished, avoiding problems is much easier. The LECTRA/SAN is not a toilet; it is an add-on sewage treatment system that works in conjunction with, but independent of, the toilet. Wiring and operation of the LECTRA/SAN are completely separate from the toilet. The LECTRA/SAN does, however, depend on the flushing force of the toilet to discharge its treated contents into the water.

Periodically check that both green indicators are operating; that the unit shuts off in approximately

2 1/2 minutes after being activated; that the vented loop (if installed) is unclogged.

Most LECTRA/SAN failures can be avoided by occasionally checking the operation and condition of the component parts. Processing anything other than human waste and salt water can cause damage to the system and invalidate the Product Limited Warranty.

**2. ALWAYS avoid additives.** The LECTRA/SAN system generates its own disinfectant and deodorant by electrolyzing salt water. Additives other than Raritan Concentrate are not required and should never be used. Cleaners, deodorants and disinfectants can have unfavorable reactions with the hypochlorous acid generated by the LECTRA/SAN. Damage to the LECTRA/SAN unit, damage to the vessel or harm to personnel may result from unauthorized addition of chemicals, cleaners or deodorants. **NOTE: UNAUTHORIZED INTRODUCTION OF ADDITIVES, INTRODUCED DIRECTLY OR THROUGH THE TOILET, IS CONSIDERED TO BE MISUSE AND ABUSE OF THE SYSTEM, AND WILL INVALIDATE THE PRODUCT WARRANTY.**

The LECTRA/SAN system, by design, does not "pump out". The effluent is macerated and exposed to the disinfectant during the treatment cycle. When the system shuts down, the treated effluent remains inside the treatment unit. Subsequent flushes of the toilet push a portion of the treated waste overboard. It takes from 3-6 flushes of the toilet (depending on time duration of the flush) before the original effluent is discharged into the water. This gives the effluent the necessary "contact time" with the hypochlorous acid to give it adequate treatment, in accordance with U.S. Coast Guard certification requirements. Any other material, chemical, cleaner, etc., likewise, would remain in the treatment unit for the duration of 3-6 flushes, giving opportunity for reactions to occur. Should a cleaner or deodorant, etc. be put into the toilet, which we strenuously discourage, the LECTRA/SAN MUST NOT BE TURNED "ON" until toilet has been flushed 15-20 times (15 second flushes) to insure that all traces of the additive have been flushed overboard.

The above also includes Winterizing procedures (see Section IX) for winter storage instructions.

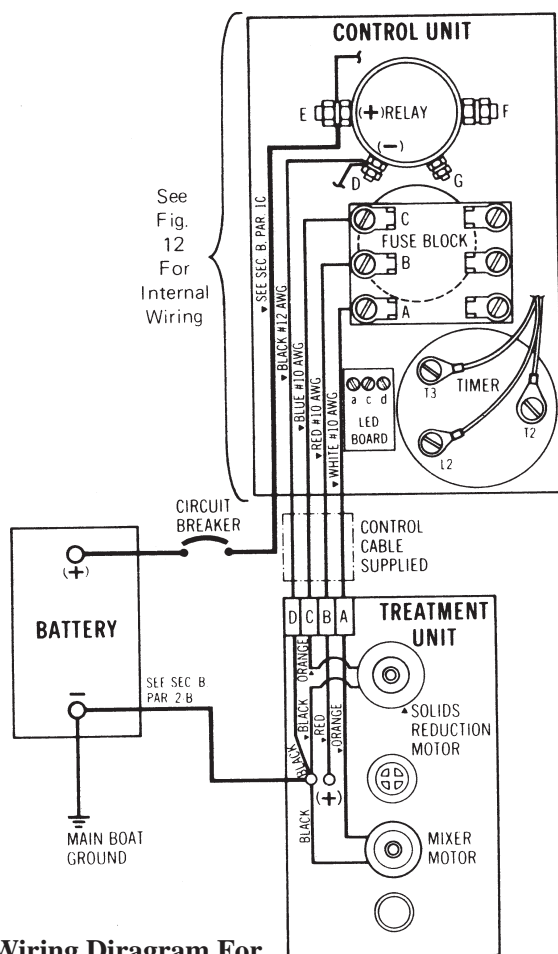


Fig. 6 Wiring Diagram For Negative Ground Boats Only

**3. Operate the system correctly.** The LECTRA/SAN system is designed to be operated each time the toilet is flushed. It is not a batch treatment system and must not be operated as such. Attempting to save battery power by skipping cycles or "short-cycling" by forcing the timer, will overload the macerator and clog the system, leading to eventual LECTRA/SAN failure. Always turn the LECTRA/SAN activating knob to Start Flush position before flushing toilet. Be sure the LECTRA/SAN has finished its cycle and shut off before leaving the boat for more than short periods.

**V. LECTRA/SAN START-UP**

**Important:** Do not operate the LECTRA/SAN if the Treatment Unit is not filled with water; flush the toilet until water runs from the discharge fitting. Note in Treatment Unit mounting instructions it mentions postponing connection of discharge hose (while the glue sets); now secure the hose on the barbed fitting.

**1. FILL SALT FEED TANK** - It has been stated previously that in many cases the salt feed tank need not be used. However, if it is decided that it is more convenient to use the salt feed tank on a routine basis, mix a saturated solution of table salt or rock salt (5 lb./2 gallons of water) in a separate container and fill the salt feed tank as required. Pour only clear brine into the salt feed tank; this will eliminate any undissolved salt from lying in the bottom of the salt feed tank and clogging the valves.

**2. ADJUST CONTROL VALVE ON SALT FEED TANK** - Under normal circumstances, meter needle should indicate within the green sector, see additional remarks and Figure 8.

Set the salt feed control valve to the position shown in the following table in order to establish the initial salt feed rate. Select the valve position for your type of dockside water.

LECTRA/SAN units manufactured after April, 1981 will sometimes show a meter reading on or slightly below the line between the low range (red) and normal range (green), especially toward the end of the treatment cycle. This does not indicate an equipment malfunction but rather, reflects a slight design change in the electrodes. See note at Fig. 8.

Initial Valve Setting	<u>Dockside Water</u>		
	<u>Fresh Water</u>	<u>Brackish Water</u>	<u>Seawater</u>
	Open	3/4 Open	Closed

**3. FILL TREATMENT UNIT\*** - If the boat is in salt water, flush the toilet until water runs out of the discharge fitting as previously explained. Insure that the discharge hose is then secured. If the boat is in fresh water, connect the discharge hose, then pour 8 oz. of table salt into the toilet bowl. Shut off the intake water valve (seacock) to the toilet and pour 3 gallons of water into the bowl while flushing the toilet; this will fill the treatment tank with the correct salt solution. Be sure to reopen intake seacock after "charging" the Treatment Unit.

**4. TEST OPERATION** - Give the knob on the Control Unit a clockwise turn until it "clicks into position", activating the LECTRA/SAN. Check for the following:

- a) Flush/Pretreat operating light "on".\*\* (Mixer motor operates throughout entire treatment cycle.)
- b) After about 30 seconds, the treatment cycle begins; treatment meter registers and both operating lights should be "on".\*\*
- c) Indicating needle should show in the low to midrange of the green (normal) area, see notes at Sect. V., 2 and at Fig. 8.
- d) After a total of about 2 1/2 minutes, the treatment cycle ends; operating lights will go off and the meter reading will drop to zero.

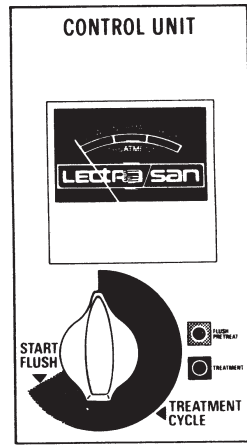
**5. READJUSTING THE CONTROL VALVE ON THE SALT FEED TANK** - If the boat is in fresh or brackish water, it is necessary to bring the salinity of the flush water up to the equivalent of seawater. This is to be done by metering the brine in the salt feed tank into the intake flush water (as shown in Figs. 3 & 4). In fresh water, open the valve fully; in brackish water, open the valve partially. The correct amount of brine will be indirectly indicated by the meter reading on the Control Unit (see note at Fig. 8).

The full effect of a brine adjustment will be indicated on the meter after several cycles of the LECTRA/SAN. This is because the water in the Treatment Unit must be replaced by flush water of the new salt concentration. Rapid, repeated sequencing will overheat the motors; make adjustments while flushing at normal 5 minute intervals.

\*Always be certain discharge seacock is open before system is operated.

\*\*LECTRA/SAN®, by design, requires cycling with each flush of the toilet. The timer knob must be turned a full 240° to engage the system; a "click" will be heard and the top light will go "on".

**Fig. 7 LECTRA/SAN Control Unit**



## VI. LECTRA/SAN OPERATION

**CAUTION:** Review all information in Section IV, before operating LECTRA/SAN on a regular basis.

**1. GENERAL** - The two operating principles of the LECTRA/SAN are:

- a) Reduction of solid waste to indiscernable particles; and
- b) Oxidation of waste matter and destruction of odors and bacteria.

LECTRA/SAN operation is automatic; the user has only to activate the system with a clockwise turn of the knob on the Control Unit before flushing the toilet.\* This starts the mixer motor and turns on Flush/Pretreat operating light. The toilet is then flushed with the minimum amount of water required to clear the bowl and connecting lines. If needed, salt is automatically fed from the Salt Feed Unit to the flush water as the toilet is being flushed. As waste-water is pumped from the toilet to the Treatment Unit, previously treated wastewater is displaced from the second chamber of the Treatment Unit and flows overboard or to a holding tank.

When Flush/Pretreat cycle is completed, the system automatically switches to the treatment cycle where the macerator motor and electrodes are activated.\*\*\* Disinfecting agent is generated to oxidize the waste and to destroy bacteria and odor. The treatment cycle lasts for two minutes, then automatically shuts off.

**2. OPERATING SEQUENCE** - A schematic illustration for the LECTRA/SAN operating sequence is shown in the table at the top of the next column:

\*\*\*It is normal for the motors on the Treatment Unit to be hot to the touch after an operating cycle. The toilet should be flushed **ONLY** during the flush/pretreat cycle (top light "on") and **NEVER** during the treatment cycle (both lights "on").

**LECTRA/SAN OPERATING SEQUENCE (Seconds)**

OPERATION	Start 0	35	Stop 155
<b>Cycles</b>			
Flush / Pretreat	█		
Treatment		█	
<b>Operation</b>			
Mixer Motor	█		
Solids Reduction Motor		█	
Electrodes		█	
<b>Operating Lights</b>			
Flush / Pretreat	█		
Treatment		█	

## 3. OPERATING INSTRUCTIONS

- a. BEFORE flushing the toilet, start the LECTRA/SAN System with a clockwise turn of the knob on the Control Unit until it "clicks". A full (240°) turn of the knob is required to engage the timer and turn on the Flush/Pretreat light.
- b. Flush the toilet with the minimum amount of water required to clear the bowl and connecting hose (between the toilet and the Treatment Unit). This will normally take 6-10 seconds with an electric toilet. With a manual toilet, pump the flush handle vigorously until the bowl is clear, plus several additional strokes to clear the connecting hose.
- c. After about 2 1/2 minutes, the operating cycle will be complete and the system will automatically shut down.
- d. The toilet is now ready for the next use.
- e. The toilet can be used during the treatment cycle, but flushing it must be deferred until the operating lights are "off" and the system is reactivated. Flushing the toilet during the treatment cycle (both lights on) may damage the unit, invalidating the product warranty.

**NOTE:** When operating the boat in fresh or brackish water, note position of the indicator needle on the Control Unit when the system is operating in the treatment cycle (both lights on). If it is not registering in the Normal range (and salt feed tank is not empty), make corrections by opening or closing the salt feed control valve as required. If after six normal uses meter reading is still not in the Normal range, review Start-Up procedures in Section V. Also check Section VII.

**4. SALT FEED ADJUSTMENTS** - The Salt feed rate was originally set up for dockside operation (Sect. V., LECTRA/SAN START-UP). When sailing into waters with significantly more or less saline, adjustments of the salt feed valve will be necessary.

**5. SALT FEED TANK REFILLING PROCEDURES**

- a. Do not let the salt feed tank run dry. The toilet will not flush satisfactorily if the tank is dry and the toilet draws in air. Check the level frequently.
- b. Dissolve salt in a separate container and pour saturated solution into the salt feed tank, being careful that no undissolved salt enters the tank. Undissolved salt in the bottom of the tank will clog components. Refer to Section V., 1.

**6. BOARDING AND DEPARTING PROCEDURES** - If the boat will not be used for more than a two-day period, a treatment cycle should be run prior to leaving. The toilet need not be flushed. Always remain on board until the cycle has finished and the system has shut off. Never add deodorants, cleaners, etc. to the flush water, see Section IV.

When the boat is to be left for long periods, an extended flush and treatment cycle should be run. Activate the LECTRA/SAN, then flush the toilet for about thirty seconds - or the duration of the Flush/Pretreat cycle. Just before the end of the Flush/Pretreat cycle, stop flushing. Allow the system to finish its cycle and shut off before leaving the boat. When leaving the boat for more than short periods, be sure that both intake and discharge seacocks are in the closed position, particularly if any portion of the toilet system is below waterline. Seacocks should be opened again before using toilet upon return to boat.

**7. BATTERY POWER** - During the treatment cycle (both motors and electrode pack operating), 12 & 24 volt LECTRA/SAN units will draw 40-50 amperes for the two minute cycle. This is approximately 1 1/2 amp./hrs. drain on the battery. (An amp./hr. is a continuous drain of one ampere for one hour.) The 32 volt LECTRA/SAN uses about one amp./hr. Both motors and the electrode pack are independently fused; each circuit can be checked in the Control Unit at terminals A, B, or C jumped to D on the relay. Circuit loadings are given in Section XII. The low-

est permissible operating voltage measured at the electrode terminals when the unit is in the treatment cycle is as follows: 12 volt systems, 11.5V; 24 volt systems, 23V; 32 volt systems, 31V. **NOTE: If a single engine boat has a 50 ampere alternator, each two minutes that the engine runs will replace the current used by one cycling of the LECTRA/SAN.**



## VII. TROUBLESHOOTING

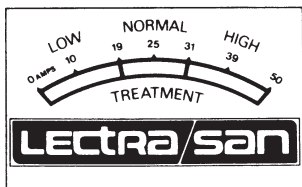
Although the LECTRA/SAN System has been designed to be trouble-free, a component malfunction may cause the system to operate incorrectly or to

become inoperative. A number of possible problems and probable causes are listed below along with recommended corrective action.

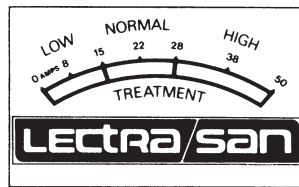
Problem	Possible Cause	Corrective Action
SYSTEM INOPERATIVE	A. No power to Control Unit	A1. Check for proper voltage with voltmeter between Lugs D & E on the Control Unit relay (see Fig. 6). A2. Be sure all connections are clean and tight. A3. Check circuit breaker or fuse; check battery and converter or charger.
	B. Improper Wiring	B1. Check wiring; compare with Figs. 6 & 12.
	C. Faulty Control Unit Timer	C1. Check for proper voltage between terminal T2 on the timer and D on the relay (see Fig. 6). C2. If voltage reading is OK, activate timer and check for voltage between L2 on the timer and D on the relay. If no reading, replace timer. C3. Check for voltage between T3 on timer and D on relay with unit in treatment cycle. If none, replace timer.
FLUSH/PRETREAT LIGHT INOPERATIVE	A. Fuse A Blown	A1. Replace fuse A. Use exact replacement only, see Sect. XI., Control Unit Parts List. A2. Be sure connections and fuse clips are clean, tight and corrosion-free. A3. If replacement fuse A blows again, inspect mixer motor for damage or excessive loading. Check for rags, etc. wrapped around impeller. If foreign material is present, remove it. Replace motor if defective.
	B. Defective LED Board	B1. Check and tighten all connections at LED board, (see Fig. 12). B2. Check for voltage between terminals A & D on the LED board, (Fig. 12) during Flush/Pretreat cycle. If voltage is correct but light does not come on, replace LED board.
	C. Defective Timer	C1. Refer to Faulty Unit Timer under System Inoperative, earlier.
TREATMENT LIGHT INOPERATIVE	A. Fuse C Blown	C2. Check terminal D on relay for tightness. A1. Replace fuse C with exact replacement, see Section XI., Control Unit Parts List. A2. Be sure connections and fuse clips are clean, tight and corrosion-free. A3. If replaced fuse blows again, inspect macerator motor for damage or excess loading. Check for rags, etc. wrapped around impeller. If foreign material is present, remove it. Replace motor if defective.
	B. Defective LED Board	A4. Check terminals on LED for tightness (see Fig. 12). B1. Check for voltage between C & D on LED board during treatment cycle. If voltage is OK and light is not on, check solder connections on LED board. If above does not correct problem, replace LED board.
	C. Defective Timer	C1. Refer to Faulty Control Unit Timer under System Inoperative, earlier. C2. Check terminal D on the relay for tightness.

Problem	Possible Cause	Corrective Action
TREATMENT LIGHT INOPERATIVE	D. Defective Relay	<p>D1. Check for voltage between D &amp; G on the relay during treatment cycle. If no voltage, check connections and recheck timer.</p> <p>D2. Check for voltage between D &amp; F on the relay during treatment cycle. If no voltage, replace relay. If voltage is OK, recheck connections.</p>
LOW METER READING	A. Insufficient Salt	<p>A1. Compare meter reading against water temperature, (see note at Fig. 8).</p> <p>A2. Check salt feed tank; refill if needed.</p> <p>A3. Check for restrictions in salt feed line.</p> <p>A4. Open valve on salt feed tank.</p> <p>A5. Inspect T-Check valve, or bowl elbow fitting, or metering plug (if Raritan Crown Head is being used). Check for restrictions.</p>
	B. Low Voltage	<p>B1. Check voltage between 1/4" electrode studs on treatment unit during treatment cycle. Low voltage is less than 11.5V, 23.5V or 31V for 12, 24 &amp; 32V units, respectively. If voltage is low, go to B2. If voltage is OK, go on to C &amp; D.</p> <p>B2. Check voltage to the Control Unit relay between lugs D &amp; E during the treatment cycle. Low voltage is less than 12V, 24V or 32V, respectively. If voltage is incorrect, check wiring for proper size. Check connections; if any are warm to the touch, clean and reconnect.</p> <p>B3. Check for fully charged battery at battery posts while LECTRA/SAN is running in treatment cycle, Voltage should not be less than 12V, 24V or 32V, respectively.</p>
	C. Mineral Buildup on Electrodes	C1. Inspect and clean electrodes (see Sec. VIII).
	D. Faulty Meter	D1. Connect a 0-50 Amp DC series ammeter between the red wire and terminal B on the Treatment Unit. Compare the reading with the reading on the Control Unit meter during a treatment cycle. Use Fig. 8 to translate amps from Control Unit meter. If more than 2 amps difference, replace meter in Control Unit.
	E. Defective Electrodes	<p>E1. Check amperage at either 1/4" terminal on the Treatment Unit during a treatment cycle (break connection and install ammeter in series with wire). Amperage should be as shown in note at Fig. 8.</p> <p>E2. Check voltage across both electrode terminals during treatment cycle, see B1.</p> <p>E3. Check battery voltage at battery during treatment cycle. If more than one volt difference between battery voltage and terminal voltage at Treatment Unit, inadequate wiring or a poor connection is indicated. <b>NOTE: Check Section XII for proper amperage draw. If all the above is correct, replace electrode pack.</b></p>
	F. Motor(s) Inoperative	F1. Check operation of mixer motor during flush/pre-treat cycle, and macerator motor during treatment cycle. Check fuses in Control Unit; replace if necessary. If fuses blow again or if motors still do not run, replace motor(s).

Problem	Possible Cause	Corrective Action
HIGH METER READING	A. Excess Salt B. Faulty Meter  C. High Battery Voltage	A1. Slightly close Salt Feed valve,(see Sect. V., 5.). B1. Refer to Faulty Meter, under Low Meter Reading earlier. C1. Check onboard charging system to insure batteries are not overcharged.
ZERO METER READING (TREATMENT LIGHT OPERATES)	A. Fuse B Blown      B. Faulty Electrode Pack     C. Faulty Meter	A1. Replace fuse B with exact replacement, see Sect. XI., Control Unit Parts List. A2. Be sure fuse clip connections are clean. Dirt and corrosion cause heat buildup which can result in blown fuses. A3. If replaced fuse blows again, inspect electrodes for a short, such as a bobby pin, etc., lodged between the plates. Remove object. A4. Fuse B can blow when salt concentration is too high. Replace fuse, reduce setting on salt feed talk and flush toilet three or four times without activating LECTRA/SAN to dilute salt concentration. B1. Check during treatment cycle for proper voltage across electrode pack terminals. B2. Disconnect red wire from terminal B on treatment unit. Connect a 0-50 Amp series ammeter between red wire and terminal B, (see Fig. 6). If no amperage but salt content is correct when unit is running in the treatment cycle, replace electrode pack. C1. If voltage and amperage are correct during treatment cycle but meter does not register, replace meter.
ZERO METER READING (TREATMENT LIGHT INOPERATIVE)	A. Blown Fuses B. Defective Timer C. Defective Relay	A1. Replace fuses B or C if blown; use only exact replacements, see Sect. XI., Control Unit Parts List. B1. Refer to Defective Relay, under Treatment Light Inoperative, earlier. C1. Refer to Defective Relay, under Treatment Light Inoperative, earlier.



MODEL 12 VDC



MODELS 24 VDC AND 32 VDC

**Fig.8 Control Unit Meter Amperage Reference Scale**

The range indicated on the meter shown in Fig. 8 are calibrated for a seawater temperature of 80° F with 12 volts measured at the electrode pack during operation. Depending upon the temperature and salt content of the water, the following readings may be considered average and/or acceptable:

TEMP OF WATER	BRACKISH	SEAWATER	(@ 12V applied to electrode pack)
90°F	27.0	27.6	
70°F	18.9	21.6	
50°F	13.8	15.0	

Should your meter read high or low, compare your reading with the meter face shown in Fig. 8, based upon the calculations above. Readings will be proportionate for 24 and 32 VDC units.

## VIII. PREVENTIVE MAINTENANCE

To assure continuous trouble-free performance of the LECTRA/SAN System a number of preventive maintenance procedures should be routinely performed. The following table lists parts to be checked, recommended frequency of maintenance, and procedures to follow:

Part	Frequency	Maintenance Steps
Salt Feed Tank	Monthly	<ol style="list-style-type: none"> <li>1. Rinse and wipe out tank and Control Valve.</li> <li>2. Be sure vent hole in cap is not blocked.</li> </ol>
Salt Feed Line	Bi-monthly	<ol style="list-style-type: none"> <li>1. Remove tubing and/or T-Check Valve; check all parts for obstructions.</li> <li>2. Wash out tubing and T-Check Valve with fresh water.</li> </ol>
Treatment Unit	Bi-monthly	<ol style="list-style-type: none"> <li>1. Insure that cover hold-down bolts are tight.</li> <li>2. Clean cover, motors and electrical contacts.</li> <li>3. Check "slots" at base of each motor to be sure motor shaft seals are not leaking; if leak is apparent, replace motor shaft seals.</li> <li>4. Be sure terminal screws are tight.</li> </ol>

Control Unit	Bi-monthly	Inspect electrical connections inside the Control Unit. If corrosion is evident, disconnect battery power from LECTRA/SAN, open connection and clean terminals with fine sandpaper or steel wool. Reassemble and spray with a waterproofing product.
Hose Fittings	Bi-monthly	Inspect all hose fittings and be sure clamps are tight.
Electrode Pack	Semi-annual	1. Flush the toilet for 60 seconds to clean out Treatment Unit, then run one treatment cycle.
Electrode Pack	Semi-annual	2. If the Treatment Unit is mounted below the waterline, disconnect the hose from the vented loop on the Treatment Unit side of the loop. Drain any excess liquid from the hose into a pan for disposal. Clean out vent line. 3. Remove the discharge hose and use a pump to remove as much liquid as possible. Allow time for liquid to drain past electrode pack partition. 4. Remove Treatment Unit cover and electrode pack. Clean plates with a stiff brush (but not a wire brush). 5. If cleaning with a brush does not remove mineral deposits, immerse electrodes (fins) in a solution of one pint muriatic acid (30-35%) to two gallons of water. Use a plastic bucket rather than a metal one. Allow the electrodes to remain immersed until all bubbling stops and the electrodes are clean. Rinse with clean water and reassemble. The purpose of the acid treatment is to remove calcium carbonate deposits which tend to build up in all marine toilets and their connecting plumbing. The build-ups occur whether or not a treatment system is installed.

## IX. STORAGE

**1. WINTER STORAGE** - The LECTRA/SAN System should be prepared for winter storage as follows:

### Salt Feed Unit

- Remove tubing from salt feed tank and toilet. Wash out tubing and "T" Check valve with fresh water.
- Washout out salt feed tank with soapy water; rinse with fresh water.
- Reconnect salt feed unit and store empty and dry.

### Treatment Unit

- If the Treatment Unit is mounted below the waterline, disconnect the hose from the vented loop on the Treatment Unit side of the loop.

Drain any excess liquid from hose into a pan for disposal. Turn off discharge seacock.

- Either remove the cap from the top of the Crossover/Separator and use a pump to remove all the water from both compartments of the Treatment Unit; or, remove discharge hose from the Treatment Unit, and using a pump, remove as much water as possible from the Treatment Unit. When it becomes obvious that the water level is below the intake ports, remove either the hose fitting (31-121) or the intake plug (31-122) and pump out any remaining water.
- The electrode pack should be inspected and cleaned: Remove the Treatment Unit cover and pull out the electrode pack. Rinse the electrodes (fins) with fresh water and clean with a stiff brush (not a wire brush), or soak the electrodes in dilute muriatic acid (See Sect. VIII) for about an hour, then brush clean after rinsing. Replace electrode pack and resecure Treatment Unit cover.

**2. RECOMMISSIONING** - Follow Start-Up instructions in Section V to put the LECTRA/SAN System back in operation.

## X. MATERIALS REQUIRED

The following non-supplied materials are needed to install the LECTRA/SAN System:

Material for Securing Treatment Unit - Teflon tape or pipe sealing compound (non-hardening), PVC (polyvinyl chloride) cement, Silicone cement, 1 1/2" I.D. fabric-reinforced rubber hose with a smooth interior to connect Treatment Unit to toilet and to thru-hull discharge fitting or holding tank, 1 1/2 Hose Clamps (one for each joint above waterline; two for each joint below waterline).

**OPTIONAL:** Vented Loop, for 1 1/2 I.D. discharge hose, 1/4" hose (or larger) to vent loop outside cabin area and the size of power wires and connectors needed to wire the LECTRA/SAN System are given below:

<u>To Connect</u>	<u>Wire Size Required</u>	<u>Solderless Crimp Style Connectors To Be Used</u>
<b>Control Unit and Battery:</b>		
if less than 10' between	#6-1	Ring Tongue for 5/16" stud
if 10'-25' between	#4-1	Ring Tongue for 5/16" stud
if more than 25' between	#2-1	Ring Tongue for 5/16" stud
<b>Treatment Unit and Main Ground:</b>		
if less than 10' between	#6-1	Ring Tongue for 1/4" stud
if 10'-25' between	#4-1	Ring Tongue for 1/4" stud
if more than 25' between	#2-1	Ring Tongue for 1/4" stud

**XI. PARTS LIST\***  
**TREATMENT UNIT**

Item	Part #	Description
1	32-102	Mixer Motor 2 1/2" Dia. 12 VDC
1	33-102	Mixer Motor 2 1/2" Dia. 24 VDC
1	34-102	Mixer Motor 2 1/2" Dia. 32 VDC
2	31-121	Hose Fitting
3	31-120	Discharge Elbow 90°
4	31-118	Electrode Lug Nut, 1/4"-20, Brass (4)
5	31-119	Electrode Flat Washer, 1/2", Brass (6)
6	31-113-1	Cover Hold Down Bolt, 10-21x3/4" (15)
7	31-103	Motor Shaft Bushing (2)
8	31-106	Motor Hold Down Bolt, 10-32x7/8", S/S (4)
9	31-109	Mixer Impeller
10	31-110-1	Impeller Bolt, 12-24x5/8", S/S (2)
11	31-110-2	Impeller Lock Washer, #12, S/S (2)
12	31-114	Cover Hold Down Nut, 10-32 (18)
13	31-115	Treatment Tank
14	31-122	Inlet Plug
15	32-5000	Electrode Pack 12 VDC
15	33-5000	Electrode Pack 24 VDC
15	34-5000	Electrode Pack 32 VDC
16	31-112	Cover Gasket
17	31-108	Macerator Set Screw, 8-32x3/16", S/S
18	31-107	Macerator Impeller
19	31-101	Treatment Cover
20	31-104	Crossover Cap
21	31-102	Motor Shaft Seal (20)
22	32-101	Macerator Motor 3" Dia. 12 VDC
22	33-101	Macerator Motor 3" Dia. 24 VDC
22	34-101	Macerator Motor 3" Dia. 32 VDC
23	31-129	Treatment Boot for (+) Lug
24	31-131	Terminal Block
25	31-113-2	Terminal Block Bolt, 10-32x1 1/4" (2)
26	31-132	Terminal Block Cover
27	31-133	Terminal Block Cover Screw, 6-32x3/4" (2)
28	31-111	Cable Clamp
29	31-113-3	Cable Clamp Bolt, 10-32x1"
30	31-101-2	Slinger (2)
	32-1000	Treatment Unit 12 VDC complete (Items 1-30)
	33-1000	Treatment Unit 24 VDC complete (Items 1-30)
	34-1000	Treatment Unit 32 VDC complete (Items 1-30)
	32-1000-S	Treatment Cover Assembly 12 VDC complete (Incl. items 1, 4, 5, 6, 7, 8, 9, 10, 11, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29 & 30)
	33-1000-S	Treatment Cover Assembly 24 VDC complete (Incl. items 1, 4, 5, 6, 7, 8, 9, 10, 11, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29 & 30)
	34-1000-S	Treatment Cover Assembly 32 VDC complete (Incl. items 1, 4, 5, 6, 7, 8, 9, 10, 11, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29 & 30)

When ordering parts, identify by Part #, not by Item #.

\*Quantities are one (1) unless otherwise noted.

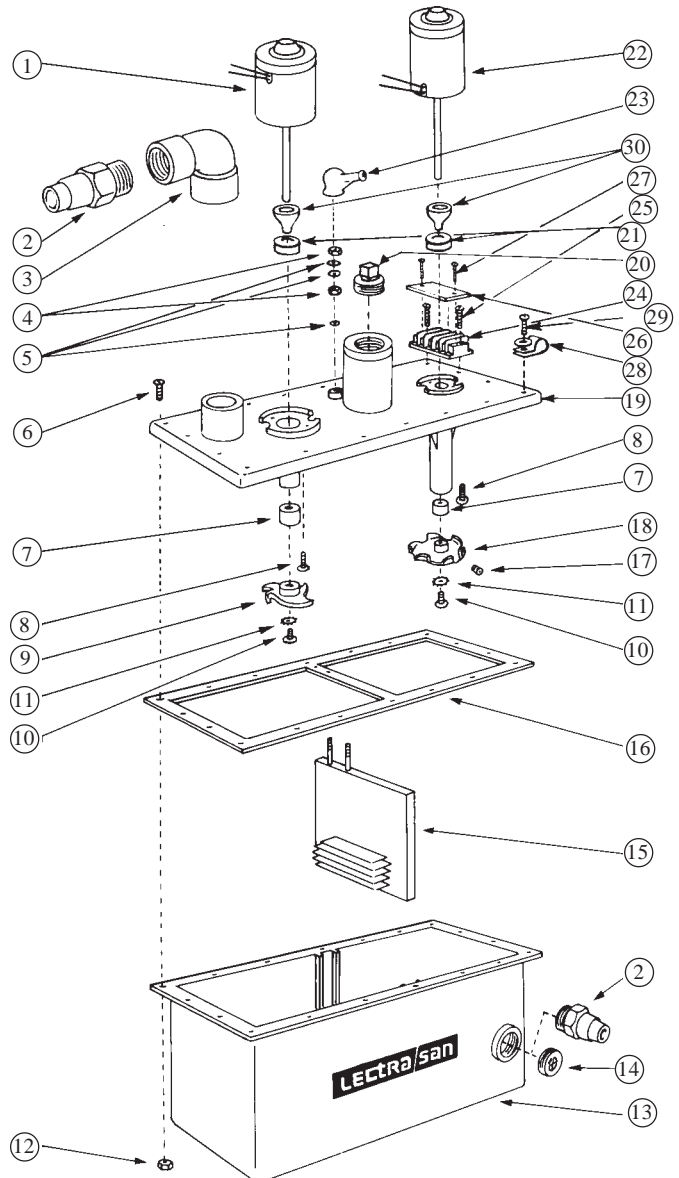


Fig. 9 LECTRA/SAN Treatment Unit

## CONTROL UNIT

Item	Part #	Description
1	31-239	Faceplate
2	32-206	Meter, 12 VDC
2	33-206	Meter, 24 VDC
2	34-206	Meter, 32 VDC
3	31-205	Control Unit Enclosure, front
4	31-201	Screw, 1/4-20x1/2", S/S (2)
5	31-224	Screw, Self-Tapping, #8Ax1/2" S/S (8)
6	31-208	Fuse Block Adapter
7	31-234	Nut, #10-32 S/S (2)
8	32-204	Solenoid Relay, 12 VDC
8	33-204	Solenoid Relay, 24 VDC
8	34-204	Solenoid Relay, 32 VDC
9	31-203	Speed Nut, 1/4-20, S/S, (2)
10	31-232	Fuse Block, Bussman, 3 pole
11	32-220	Fuse, (C) MDL 30 (For Model 12 VDC)
11	33-220	Fuse, (C) MDL 25 (For Model 24 VDC)
11	34-220	Fuse, (C) MDL 20 (For Model 32 VDC)
12	32-219	Fuse, (B) MDL 35 (For Model 12 VDC)
12	32-219	Fuse, (B) MDL 30 (For Models 24, 32 VDC)
13	32-218	Fuse, (A) MDL 6 1/4 (For Models 12, 24 VDC)
13	32-218	Fuse, (A) MDL 5 (For Model 32 VDC)

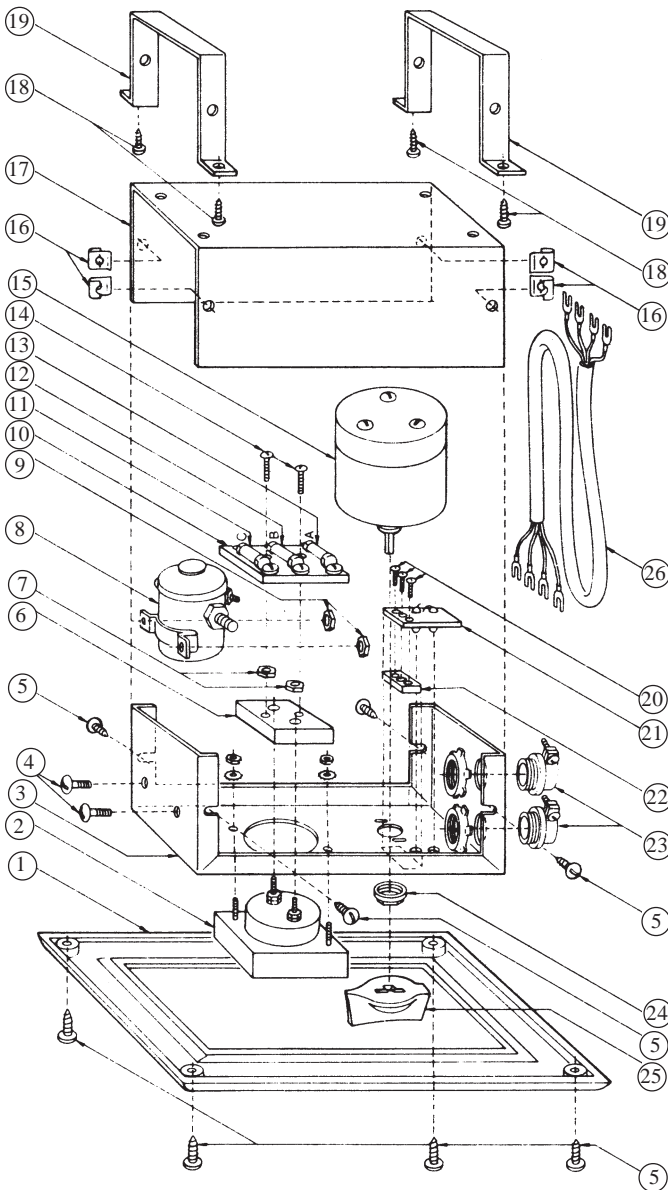


Fig. 10 LECTRA/SAN Control Unit

## CONTROL UNIT (Con't)

Item	Part #	Description
14	31-233	Screw, #6-32x1/2" S/S (2)
15	31-200	Timer
16	31-225	Speed Nut, Tinnerman (4)
17	31-205-A	Control Unit Enclosure, Back
18	31-245	Screw, #12Ax1/2" Self-Tapping, for Enclosure Back (Item 17) or Brackets (Item 19, (4)
19	31-240	Bracket, Flush Mounting (2)
20	31-217	Screw, #4-40x3/16" S/S (3)
21	32-227	LED Circuit Board (For Model 12 VDC)
21	33-227	LED Circuit Board (For Model 24 VDC)
21	34-227	LED Circuit Board (For Model 32 VDC)
22	31-209	LED Circuit Board Adapter
23	31-229	Strain Relief Connector, 1/2" (2)
24	31-243	Timer Lock Nut
25	31-242	Timer Knob
26	31-210	Control Cable, 4-Conductor
	32-2000	Control Unit, 12 VDC Complete (Items 1-25)
	33-2000	Control Unit, 24 VDC Complete (Items 1-25)
	34-2000	Control Unit, 32 VDC Complete (Items 1-25)

When ordering parts, identify by PART #., not by ITEM #.

## SALT FEED UNIT

Item	Part #	Description
1	31-301	Salt Feed Tank
2	31-302	Salt Feed Tank Cap
3	31-303	Tank Adapter
4	31-304	Control Valve
5	31-308W	Siphon Check Valve Assembly
6	31-305	Tubing, 1/4"
7	31-307	T-Check Valve Assembly
9	31-307B	Spring
10	31-307C	Check Ball
11	31-307D	T-Check Valve Body
12	31-307F	Washer
13	31-307D1	Outlet Adapter
	31-3001	Salt Feed Unit Complete (Items 1-13)

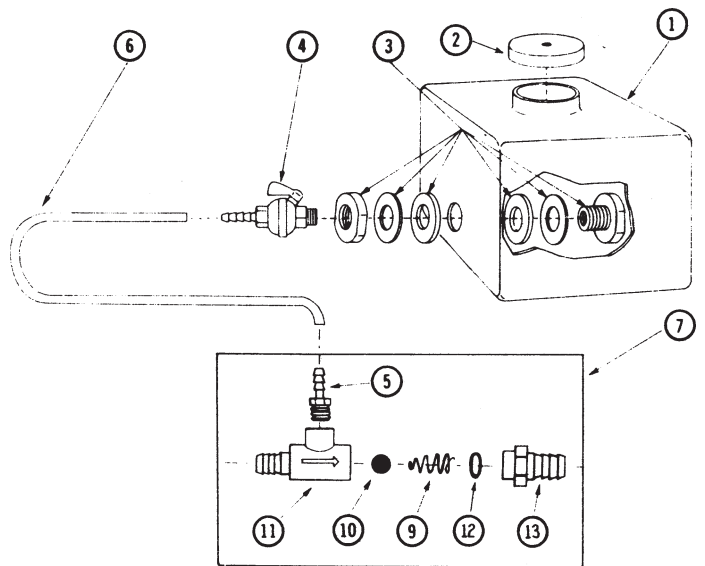


Fig. 11 Salt Fed System

## MISCELLANEOUS

Part #	Description
41-600	Owner's Manual
41-601	Wall Placard
41-602	Template

When ordering parts, identify by PART #, not by ITEM #.

## XII. SPECIFICATIONS

Design Capacity: For use with one marine head  
 Use Capacity : Four (4) persons (average)  
 MSD Type: Type I, U.S.C.G. Certified

Electrical:	<u>Model 12VDC</u>	<u>Model 24VDC</u>	<u>Model 32VDC</u>
Voltage	12VDC	24VDC	32VDC
Power	1 1/2 amp./hrs	1/1/2 amp./hrs.	1 amp./hr.
Current	50 amps	42 amps	35 amps

Maximum angle of pitch and roll: Thirty degrees (30°).

Use Environment: For use in fresh, brackish or salt water.

	<u>Treatment Unit</u>	<u>Control Unit</u>	<u>Salt Feed Unit</u>	
Size, inches:				
Length	16	4	9	
Width	8 3/4	2 3/4	9	
Height of Tank	8 1/2	7	6	
Overall height	13	-	7	
Capacity, gal	3	-	2	
Weight, lbs.	13	2	1 1/4	
Material	PVC	Aluminum	Polyethylene	
Maximum Amperage at:	<u>12VDC</u>	<u>24VDC</u>	<u>32VDC</u>	<u>FUSE</u>
Solid Reduction Motor	20	16	9	C
Mixer Motor	5	4	4	A
Electrode Pack	25	22	22	B
Fuse Sizes:	<u>12VDC</u>	<u>24VDC</u>	<u>32VDC</u>	
Fuse A	MDL 6 1/4	MDL 6 1/4	MDL5	
Fuse B	MDL 35	MDL 30	MDL 30	
Fuse C	MDL 30	MDL 25	MDL 20	

**NOTE: Inclusion of the following statement is required by the amendments to the U.S. Coast Guard Marine Sanitation Device Regulations (33 CFR, Part 159) as published in the Federal Register, Vol. 41, No. 71, Monday, April 12, 1976, page 15326.**

The EPA standards state that in fresh water lakes, fresh water reservoirs, or other fresh water impoundments whose inlets or outlets are such as to prevent the ingress or egress by vessel traffic subject to this regulation, or in rivers not capable of navigation by interstate vessel traffic subject to this regulation, marine sanitation devices certified by the U.S. Coast Guard installed on all vessels shall be designed and operated to prevent the overboard discharge of sewage, treated or untreated, or of any waste derived from sewage. The EPA standards further state that this shall not be construed to prohibit the carriage of Coast Guard-certified flow-through treatment devices which have been secured so as to prevent such discharges. They also state that **waters where a Coast Guard-certified marine sanitation device permitting discharge is allowed include coastal waters and estuaries, the Great Lakes and interconnected waterways, fresh water lakes and impoundments accessible through locks, and other flowing waters that are navigable interstate by vessels subject to this regulation (40 CFR 140.3).**

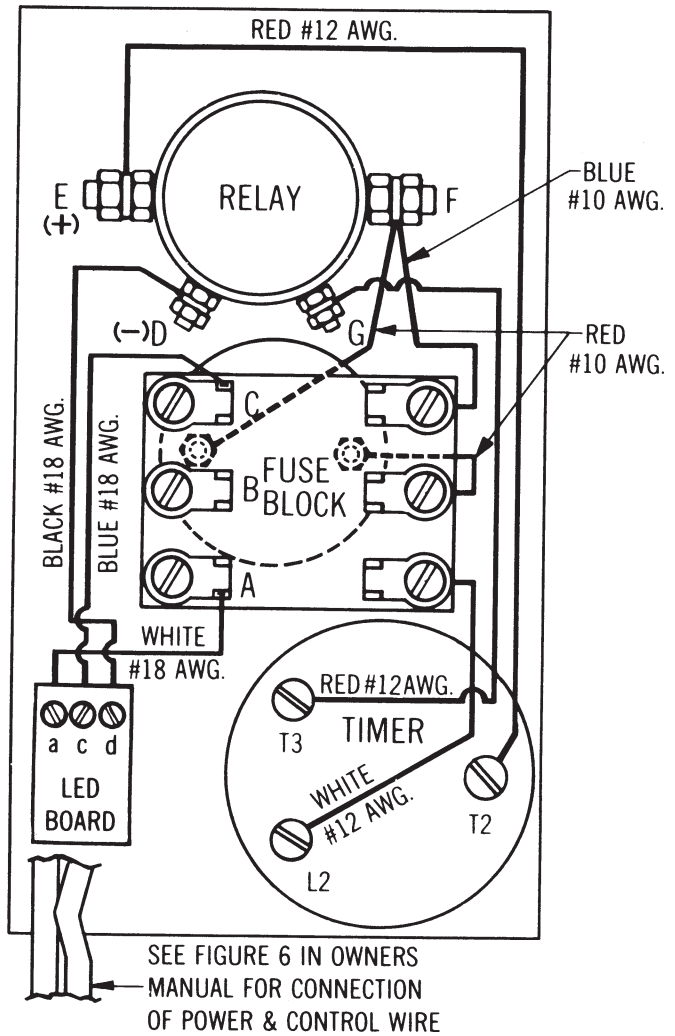


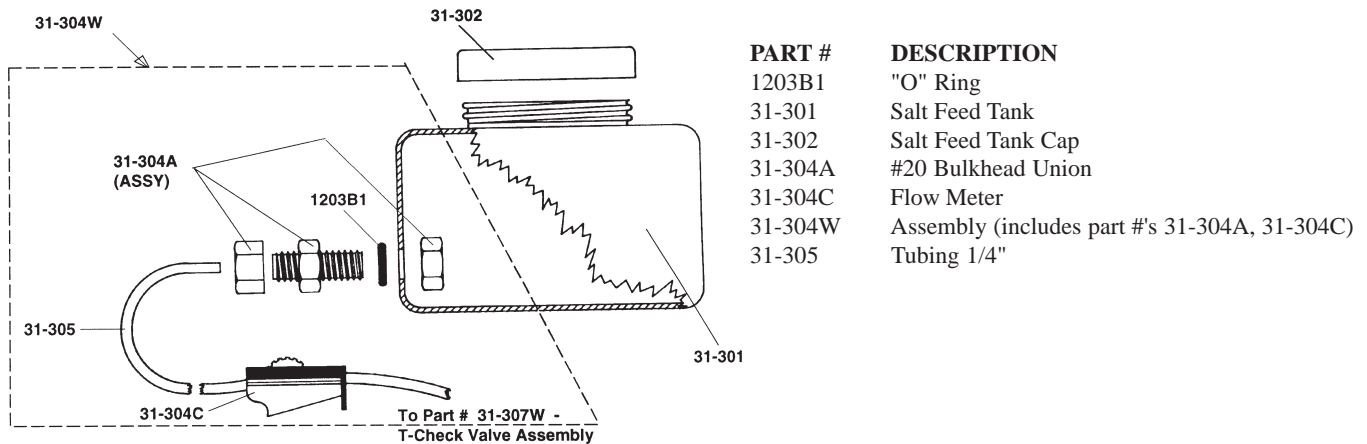
Fig. 12 Control Unit Internal Wiring

**Recommendations and suggestions appearing in this manual concerning the use of our products are based upon tests and data believed to be reliable. Since the actual use by others is beyond our control, no guarantee, expressed or implied, is made by Raritan Engineering Company, Inc. as to the effects of such use or the results to be obtained; nor is any information to be construed as a recommendation to infringe any patent or to practice any process in violation of any law or any government regulation.**

## SALT FEED UNIT

The Diagram below supersedes Figure 11 Salt Feed System in the Installation and Maintenance Instructions

**When ordering parts, please refer to part #'s on following diagram:**




### LIMITED WARRANTY

Raritan Engineering Company warrants to the original purchaser that this product is free of defects in materials or workmanship for a period of one year from the product's date of purchase. Should this product prove defective by reason of improper workmanship and/or materials within the warranty period, Raritan shall, at its sole option, repair or replace the product.

1. TO OBTAIN WARRANTY SERVICE, Consumer must deliver the product prepaid, together with a detailed description of the problem, to Raritan at 530 Orange St., Millville, N.J. 08332, or 3101 SW 2nd Ave. Ft. Lauderdale, FL 33315. When requesting warranty service, purchaser must present a sales slip or other document which establishes proof of purchase. **THE RETURN OF THE OWNER REGISTRATION CARD IS NOT A CONDITION PRECEDENT OF WARRANTY COVERAGE.** However, please complete and return the owner Registration Card so that Raritan can contact you should a question of safety arise which could affect you.
2. **THIS WARRANTY DOES NOT COVER** defects caused by modifications, alterations, repairs or service of this product by anyone other than Raritan; defects in materials or workmanship supplied by others in the process of installation of this product; defects caused by installation of this product other than in accordance with the manufacturer's recommended installation instructions or standard industry procedures; physical abuse to, or misuse of, this product. This warranty also does not cover damages to equipment caused by fire, flood, external water, excessive corrosion or Act of God.
3. **ANY EXPRESS WARRANTY NOT PROVIDED HEREIN, AND ANY REMEDY FOR BREACH OF CONTRACT WHICH BUT FOR THIS PROVISION MIGHT ARISE BY IMPLICATION OR OPERATION OF LAW, IS HEREBY EXCLUDED AND DISCLAIMED.** ALL IMPLIED WARRANTIES SUCH AS THOSE OF MERCHANTABILITY AND OF FITNESS FOR A PARTICULAR PURPOSE, IF APPLICABLE, AS WELL AS ANY IMPLIED WARRANTIES WHICH MIGHT ARISE BY IMPLICATION OF LAW, ARE EXPRESSLY LIMITED TO A TERM OF ONE YEAR. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG A LIMITED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.
4. **UNDER NO CIRCUMSTANCES SHALL RARITAN BE LIABLE TO PURCHASER OR ANY OTHER PERSONS FOR ANY SPECIAL OR CONSEQUENTIAL DAMAGES, WHETHER ARISING OUT OF BREACH OF WARRANTY, BREACH OF CONTRACT, OR OTHERWISE.** SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.
5. No other person or entity is authorized to make any express warranty, promise or affirmation of fact or to assume any other liability on behalf of Raritan in connection with its products except as specifically set forth in this warranty.
6. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

### SAVE THESE INSTRUCTIONS

To order replacement parts or to request additional information or assistance, contact Raritan Customer Service at:

	<h1 style="margin: 0;">RARITAN</h1> <p style="margin: 0;"><b>Engineering Company, Inc.</b></p>	<p>530 Orange Street, P.O. Box 1157, Millville, NJ 08332 USA                  Telephone: 609-825-4900 FAX: 609-825-4409                  Southern Office and Plant:                  3101 SW Second Avenue, Fort Lauderdale, FL 33315 USA                  Telephone: 954-525-0378 FAX: 954-764-4370</p>
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