

# *Serenity Houseboat*



Standard Operating Procedures for:

## Generator and Power Systems

### I. Generator

#### a. Overview

The Serenity is equipped with a Westerbeke 12.5-kW generator located in the center of the engine compartment, between the two main engines. This generator provides the houseboat with AC power when away from the slip. It is powered by a 4-cylinder engine that has a closed cooling system that draws raw cooling water from the lake and passes it through a heat exchanger. The generator can be controlled (started/shut down) either at the generator itself or from the controls on the main breaker panel in the salon.

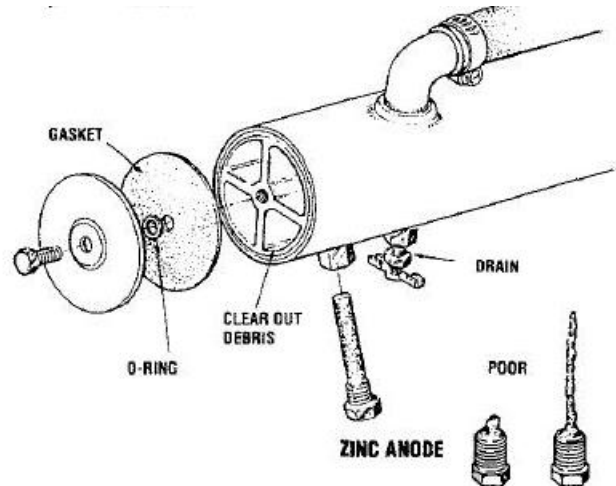
#### b. Before Starting

- i. Check the engine oil level.
- ii. Visually inspect the generator (hoses, belts, etc.).
- iii. Ensure that cooling water intake is open.
- iv. Visually inspect the cooling water strainer and clean if necessary.
- v. Inspect the Heat Exchanger zinc anode (once per month).
- vi. Always run the engine compartment blower for at least 5-minutes prior to starting the generator or main engines.
- vii. Always make sure that there is no electrical load on the generator by switching off all breakers on the AC panel.

#### c. Starting Procedure

- i. Depress STOP switch. If the generator was shut down from a different control station, the generator will not start until the stop switch has been depressed.
- ii. Depress the PREHEAT switch and hold it for 5-seconds to prime the fuel system.
- iii. Continuing to hold the PREHEAT switch, press the START switch.
- iv. Once the generator starts, release the START switch, but continue holding the PREHEAT switch until the generator comes up to speed.
- v. Once the generator has run for 2-3 minutes, you can switch on the generator breakers and begin turning on AC breakers one at a time, gradually loading the generator.
- vi. Note that it can be difficult to hear the generator starting from the forward control panel, so it may be beneficial to start the generator from the control panel on the generator itself or have someone positioned on the back deck to tell you when it has started.

- d. Securing Procedure, then shut it
  - i. Switch off breakers to remove load from generator.
  - ii. Allow generator to run for 5-10 minutes in order to cool down with no load on the system.
  - iii. Depress the STOP switch and hold until the generator is completely stopped.
- e. Maintenance
  - i. Regular Required Maintenance. Refer to the owner's manual for a list of all required regular maintenance items. If one of these falls due during your week on the boat, it becomes your responsibility to ensure that it is complete prior to the next owner taking possession of the boat. You may perform most maintenance items yourself, unless it is specifically noted to be completed by a license mechanic. However, you may opt to have Executive Services or other provider complete any maintenance item.
  - ii. Oil Change. The oil is recommended to be changed every 200-hours with full synthetic oil. If this regular maintenance item comes up during your week on the houseboat, it is your responsibility to ensure that it is complete before the next owner takes possession of the boat. The procedure for changing the oil is outlined below, but you also have the option of having Executive Services or other provider complete this regular maintenance item.
    - 1. Run the generator to bring it up to temperature.
    - 2. Shut down the generator.
    - 3. Locate the oil sump drain hose on the bottom of the engine and remove the plug.
    - 4. Connect an oil sump pump to the oil sump drain hose.
    - 5. Pump out all the oil from the sump.
    - 6. Disconnect the pump and replace the plug.
    - 7. Change the oil filter.
    - 8. Refill the oil with 4-quarts, check the oil level and then top off to desired range.
  - iii. Cooling System. The cooling system is a closed system that uses a 50/50 antifreeze mixture. There is an overflow reservoir mounted at the front side of the center engine compartment hatch. Ensure that it is in the allowable range.
  - iv. Sea Strainer/Raw Cooling Water.
    - 1. The generator brings in raw cooling water from the lake and passes it through a heat exchanger with the closed cooling system. This raw cooling water comes in from a seacock near the transom on the port side of the engine compartment center hatch. There is a sea strainer for this raw cooling water that must be cleaned regularly to provide good flow. To do this:
      - a. Close the seacock valve to prevent water intrusion.
      - b. Unscrew the top of the sea strainer and remove the basket.
      - c. Dump the basket and blow it out with water or compressed air.
      - d. Replace the basket, screw the top back on, and reopen the seacock valve.
    - 2. The heat exchanger has a zinc anode to protect it from corrosion. This anode should be checked at a minimum of once a month and replaced if it is deteriorated to poor condition. Prior to removing the zinc anode to check it, be sure to close the raw cooling water seacock valve near the transom on the port side of the engine compartment center hatch. Refer to the image below.



## II. Inverter

### a. Overview

The Serenity is equipped with a Xantrex Freedom 3000-W inverter/charger that supplies 3000-W of utility grade power for operation of AC appliances from the deep cycle batteries (6 6-V batteries wired in series to operate as a 12-V system) in the forward battery compartment. The inverter is wired to supply power to the Galley refrigerator when the generator and shore power is not available. When shore power or generator power are available, it functions as a 150-A battery charger to maintain the deep cycle batteries in the forward battery compartment. The inverter itself is located in the forward most part of the middle hold, accessible through the hatch just behind the lower helm station, but all functions should be able to be performed using the control panel located next to the breaker panel in the main salon.

### b. Operation

- i. **Battery Switch.** Ensure that the battery switch in the forward battery compartment is in the ON position.
- ii. **Breaker Panel.** Ensure that the Inverter/Refrigerator breaker is in the ON position on the AC section of the breaker panel.
- iii. **Charge Setting.** When not on shore power the Max Charge Rate must be reduced. The inverter has a 150-A charger and will be set on 100% when connected to shore power, but this is a significant draw on the generator and will prevent you from operating other large draws like the HVAC system. In order to do this, follow the procedure below.
  1. Using the Remote Control Panel mounted near the Breaker Panel in the main salon, select the FSW3000 from the menu of devices.
  2. Scroll down and select Basic Settings.
  3. Scroll down and select Max Charge Rate.
  4. Set Max Charge Rate to around 70%.
  5. Note that you can leave the Max Charge Rate up higher if you are not running any other major AC draws for faster battery charging. Also, if you are putting extremely heavy loads on the system, you may need to reduce the Max Charge Rate further (if the breaker for the generator trips, you must reduce the load in some way and reducing the Max Charge Rate is one possibility).
- iv. **Additional Operations.** No other settings on the inverter should require changing; for further information on managing the inverter, you should consult the owner's manual.

### III. Power Panel

#### a. Overview

The breaker panel in the main salon is the central control for all electronic systems aboard the Serenity. The panel is divided into a DC board and an AC board, which collectively control power distribution to all systems, except the main engines and engine controls, aboard the houseboat.

- b. System Test Gauges. At the top of the panel you will find three test gauges with switches to actuate them. Also at the far right side of the top of the panel are the generator controls. The test gauges are listed below.
  - i. Battery Voltage. The first gauge shows the voltage on two battery banks. If you push the selector switch to the 1 position, it will display the house battery bank voltage. If you push it to the 2 position, it will display the generator battery voltage. Both of these should be about 12.5-V.
  - ii. AC Amps. The second gauge shows the amperage on each of the two legs of the AC power panel. This gauge is currently inoperative, but would show the amperage draw on each leg of the AC system.
  - iii. AC Voltage. The third gauge shows the voltage on each of the two legs of the AC power panel. You can select leg A or leg B with the selector switch, both should read approximately 115-V.
- c. DC Breakers. The top of the panel is the 12-V DC power distribution system, and is labeled as such. Breakers are labeled to indicate what they control and can be turned on and off as needed.
  - i. Of note is the Mid Bilge Pump override switch; the bilge pump has an automatic float switch and will run if the float switch is triggered by water in the bilge, but this switch on the breaker panel will override the float switch and turn the bilge pump on.
  - ii. No DC Breakers must be left on.
- d. AC Breakers. The lower portion of the panel is the 120-V AC power distribution system.
  - i. At the top of the panel is a swing breaker that allows you to choose between turning on the main breaker for shore power or generator power. Only one may be turned on at a time and the swing breaker cover prevents them from both being in the on position.
  - ii. Immediately to the right of the swing breaker is a reverse polarity warning light. If this is lighted the incoming shore power is reverse polarity and the system should not be engaged until the issue is resolved. You can test that indicator light with the test switch right below the light.
  - iii. Each side of the panel has a column of 120-V breakers and in the center is a column of 240-V breakers. These are all labeled as to what components they control. Additionally, the breakers that should be left on when the houseboat is in the slip and connected to shore power are marked and are listed below:
    - 1. Battery Charger. Charges the house batteries in the engine compartment.
    - 2. Invertor/Refrigerator. Allows Inverter to act as charger to maintain deep cycle batteries in forward battery compartment.
    - 3. Air Cond. Compressor.
    - 4. Air Cond. Handler.