

OPERATION MANUAL

BLONDIE



Welcome aboard ***BLONDIE***

We are happy you have chosen Anacortes Yacht Charters for your vacation. We are sure you will enjoy cruising the lovely waters of the Pacific Northwest.

We hope you will enjoy your time on ***BLONDIE*** as much as we do. You will find she is very maneuverable and easy to pilot in close quarters.

cruises ***BLONDIE*** very economically at around 8 to 13-knots but has the power to reach up to 18-20 knots if necessary. The open interior and large windows will give you 360-degree visibility and makes ***BLONDIE*** feel much larger than she is.

BLONDIE has a full galley including a microwave and 6-bottle wine/beverage cooler.

We trust this manual will help you become familiar with the boat. If you have questions about the boat, or about places to visit, please do not hesitate to ask the AYC staff.

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LOCATION OF KEY ITEMS

FOR COAST GUARD INSPECTION

- Boat Documentation** – *BLONDIE* is a U.S. Coast Guard Documented vessel. The NO # 1313199 is permanently affixed to the hull, inside the Engine Compartment. In the event you are boarded by the Coast Guard or other Law Enforcement agency, the Certificate of Documentation is located in this manual under the Documentation section.
- PERSONAL FLOATATION DEVICES** – four adult and two child’s size life vests located in the port side lazarette. There also two auto inflator Life Vest in Mid Berth.
- THROW CUSHION** – One Throw Cushion located in port side rear hatch.
- FIRE EXTINGUISHERS** – There are three. One mounted in the mid-berth entry and the other in the forward stateroom and main cabin rear door.
- VISUAL DISTRESS SIGNALS** – Flares, flare Gun (in orange box) Starboard side lazarette.
- BELL, NAV LIGHTS and BOAT HORN** – Located at Helm.
- POLLUTION PLACARD** – Mounted in engine compartment (under cockpit hatch) on port side.
- MARPOL Trash Placard** – Mounted inside cabinet under kitchen sink on right side.
- CARBON MONOXIDE STICKER** – Located rear transom near hatch.
- NAVIGATION RULES AND STATE/LOCAL REQUIREMENTS** – Under V-berth Bed.

OTHER ITEMS

- SPARE PARTS** – Under the forward cushion of the forward stateroom bed.
- MECHANICS TOOLBOX** – Located in the starboard side lazarette
- MISCELLANEOUS TOOLS** – Wire ties, tape, hammer, tie-down straps etc.
In plastic bin in starboard lazarette
- FIRST AID KIT** – shelf in mid berth, v-berth head cabinet
- THRU HULL PLUG** – Starboard Lazarette in bin.
- WINDLASS WRENCH** – Located in anchor chain locker in eye bolt or in Ranger bag under v-berth.
- OWNERS MANUALS** – Black ranger tugs briefcase under V-berth Bed.
- PAPER CHARTS** – Shelf in roof area over helm.
- CANADIAN FLAG** – Located under Stove, or above helm.
- 15- & 20-AMP POWER ADAPTERS** – Starboard lazarette in bin.
- CLEANING SUPPLIES** – Galley
- DINGHY GAS CAN, PROPANE TANKS** – Storage bin on swim step
- FUNNEL AND SPARE OILS** – Under Rear Helm.
- BBQ REGULATOR** – Located in galley Drawer.
- 50' BLUE EXPANDABLE HOSE FOR FRESH WATER CONNECTION/FILL ONLY** - Located in bucket Starboard Lazarette.
- 50' GREY EXPANDABLE HOSE & NOZZLE FOR WASH DOWN** – Located in starboard lazarette
- SPARE ANCHOR, CHAIN & RODE** – Located in port side lazarette.
- DINGHY COME-ALONG** – Cockpit ceiling or rear helm.

BOAT OPERATION

Engine Inspection

Remember your “**COBBSS**” every morning: **C**oolant, **O**il, **B**ilges (Inspect and Pump-out), **B**elts, **S**ea Cock, and **S**ea Strainer.

The engine hatch is hydraulic and is opened and closed from the bottom left switch on the side of the rear helm. If this ever fails to operate you can manually open and close the hatch cover, **BUT BE CAREFUL**, if you open manually you must close manually because there will be no hydraulic pressure built up. The hatch will drop like a rock if you don't hold onto it!

CAUTION: Ensure the cabin door is either fully open or closed before opening the engine compartment!!!

Check the level of **C**OOLANT in the overflow reservoir. The reservoir is located on the engine forward just below the cabin door, this cap is marked by a yellow sticker with a black hand on it. The coolant level should be anywhere above the lowest point of the U-shaped indicator, but not above the upper portion of the U.

Check the level of **O**IL in the engine by checking the dipstick located at the forward port side of engine. The dipstick has a red handle located between the two white filters. Look at the etch marks on the dipstick that indicates the proper oil level. **DO NOT OVERFILL OIL!** Overfilling is a bad thing to do to a diesel engine. The excess oil will escape somehow, perhaps by blowing a head gasket. Oil is filled at the top of the engine. Only fill if oil levels are below the ½ way mark. Use the onboard spare oil to add no more than a cup at a time. Then check the level again. Please use a paper towel or oil rag, not the dish towels! Expect the oil to be blacker than that of a gasoline powered automobile engine... this is normal for a diesel after only a few hours of operation.

Check the **B**ILGES to be sure they are free of debris and oil. (A small oil sheen on a small amount of water is normal.)

Check the general condition of the **B**ELTS, HOSES, and FUEL LINES.

Ensure the valve on the RAW WATER **S**EA COCK is in the ‘open’ position (lever in-line with valve).

Observe the glass of the RAW WATER **S**TRAINER for debris. If necessary, close the sea cock, open the strainer cover, clean the strainer, and reassemble. Remember to reopen the sea cock.

Start-Up

Before starting the engine, do your inspection and **consult the start-up and shut-down checklist**. Ensure the THROTTLE is in 'neutral', or the engine cannot be started because of the "neutral lockout".

Wave key fob in front of the ignition button on starboard side of forward helm. Once you hear beep and see green light you may push the start/stop button to start the motor. If the starter does not engage when the button is pushed once, move the gearshift lever slightly until you find neutral and try again while turning key. Expect the engine to start within 2 seconds. If the engine doesn't start after 5 seconds of cranking, wait 15 seconds and try again. Never push button longer than 10-seconds, starter damage will result.

If the engine cranks slowly or fails to turn over, check the condition of the battery on the ELECTRICAL PANEL. If the battery is low, try the BATTERY PARALLEL ROTARY SWITCH located in the port side lazarette to connect the other batteries. The parallel switch can draw power from the House Batteries (#1), the Thruster Battery (#2) or from both 1 and 2. **DO NOT TURN PARALLEL SWITCH WHILE MOTOR IN RUNNING! Wait until you turn off motor to rotate back.**

VERIFY THAT WATER IS BEING EXPELLED FROM THE EXHAUST.

AVOID RUNNING THE ENGINE AT IDLING SPEED ANY LONGER THAN NECESSARY and run engine at low speed under moderate load for approximately 5 minutes. Note - A light load on a cold engine provides better combustion and a faster engine warm-up than no load.

Observe the readings on the gauges. The oil pressure will register about **64 PSI** @ cruise. The engine temperature should rise slowly to about **170 to 180** degrees.

Note -- If oil pressure is low, shut down engine, and inspect engine compartment and look for possible cause (for example, loss of oil.) Caution -- If an engine is overheating or there is lack of raw water expelled from the engine exhaust, stop the engine immediately. Recheck the raw water-cooling system to ensure the seacock is open (handle in-line with valve). Next, check the raw water strainer for debris. If there is debris, CLOSE THE RAW WATER SEACOCK, unscrew the clear bubble top of the strainer, remove the foreign material, screw the clear top back on the strainer and open the RAW WATER SEACOCK. Restart the engine and re-check water flow from the exhaust. If water is not flowing properly, the RAW WATER PUMP may need to be serviced. Seek help.

Operation

Engines are very reliable. Optimal cruising speed is obtained at **2000 RPM** which will result in about 8 knots with fuel consumption < **3 GPH** at this cruising speed but is highly variable based on tides, wind and loading of the vessel. **DO NOT EXCEED 3300 RPM** on the engine. Running at **15 knots** will increase fuel consumption **DRAMATICALLY** so slow down and enjoy the cruise! Most destinations are fairly close together in the San Juan Islands.

To avoid the possibility of sucking air or sludge when the fuel level approaches 1/4th of a tank, refuel when the fuel drops below half full and before it reaches 1/4 full.

Engine Overheating: If the buzzer sounds while the engine is running, about 99 times out of a 100, it is no more serious than eelgrass plugging up the raw water strainer. The best solution to this problem is prevention. Keep an eye out for eelgrass mats especially along those “soapy” looking tides and eddy lines in the water, and don’t run over it. When eelgrass gets sucked into the engine cooling water intake, it jams at the raw water strainer.

*To clear the eelgrass from the raw water strainer, stop the engine, open the engine hatch, **CLOSE THE RAW WATER SEACOCK**, unscrew the clear bubble top of the strainer, remove the foreign material, screw the clear top back on the strainer and open the **RAW WATER SEACOCK**. Restart the engine.*

If upon restarting, the engine overheats again, check the strainer to make sure it is drawing water in to about 3/4 full. If not, grass could be plugging the opening in the hull. This requires diving under the boat to clear the eelgrass, so you should contact Anacortes Yacht Charters. If the above fails to solve the problem, contact Anacortes Yacht Charters for assistance. There may be other reasons you hear the buzzer. If you lost oil pressure, the oil icon warning light will light up, so check which light is showing red. If it’s the oil light, shut down the engine, check the oil level and contact Anacortes Yacht Charters.

The alarm buzzer is more likely to indicate engine overheating, and the temperature icon light will light up. Before you shut down the engine, check for water gurgling out the engine exhaust. If you have a “wet exhaust”, check the coolant level in the overflow reservoir and if no coolant is seen, add enough coolant to reach the “full” line of the bottle. Check the bilge for coolant. If coolant is found, contact Anacortes Yacht Charters. If the coolant reservoir is full, check to see if the engine threw a belt. Without a belt on the raw water pump, the raw water won’t circulate and cool the engine. (Replacement belts are located in the spare parts box, under the forward bed.) Another possibility is the impeller in the raw water pump has failed. (A replacement impeller is found with the engine spares.) Contact Anacortes Yacht Charters if you suspect you have an impeller problem.

Shut-Down

Before shutting down, allow the engine to idle for about 2 minutes to cool gradually and uniformly. Ensure the THROTTLE is in the neutral position. Turn off the engine by pushing start/stop button. Wave fob in front of ignition hear beep and ensure green light goes out and ignition turned off.

Getting Underway

Turn off the Battery Charger at Controller, then turn off A/C main on panel, turn off breaker at shore, then DISCONNECT the shore power cord (see 110-Volt A/C section). Close the PORTHOLES, WINDOWS, and HATCHES. Turn on your VHF (channel 16) and electronics. ASSIGN crew members their various positions and tasks. Verify Thrusters are turned ON. Note - when pulling away from the dock, make sure dinghy is clear of any shore-side obstacles such as cleats and pilings, otherwise it may hit and possibly damage the dinghy. Once outside the marina, idle the engines while crew brings in fenders and lines.

Cruising

Engage the THROTTLE and slowly advance to the desired cruising speed. Optimal cruising speed is about 2700 RPM. If you run at 2700 RPM you will cruise at about 10 knots and use approximately 3 gallons of diesel per hour. Your speed will vary depending upon the weight and load and weather conditions.

TRIM TABS can be adjusted to bring the bow down and level the boat.

Note -- Avoid higher engine speeds as it causes higher engine temperature, possible damage, and higher fuel consumption. Volvo Penta recommends running below 3300 rpm for 90% of engine hours.

Docking

During docking, have your crew make ready the lines and fenders and give clear instructions on how you will be docking. Often times your crew will need to step off from the swim step with the stern line. The helmsman can hand over the midship line, and if available, a crew member can be at the bow to hand over the bow line.

Turn the bow and stern thrusters on prior to docking (thrusters will shutoff automatically after about 5 minutes so you may need to reactivate them. While throttle is in NEUTRAL, use the bow and stern thrusters IN SHORT BURSTS to assist in docking.

Using the two joy sticks will activate the thrusters in the direction you push the joystick. Use short bursts of the thrusters or the circuit breaker may trip.

Fueling

The MAIN diesel tank fuel fill is located on the starboard side deck next rear helm. It has a twist off cap marked DIESEL. The vent is just below the fill and must be monitored during the fill process.

MAKE SURE YOU HAVE THE RIGHT FUEL! DIESEL! DIESEL! DIESEL!
MAKE SURE IT IS GOING INTO THE CORRECT DECK FILL! DOUBLE-CHECK!

Before pumping, have oil/fuel sorbs handy to soak up spilled fuel. To determine how much fuel you need to fill the tank (max 180 gal), go to the Garmin touch screen and then to Navigation Charts and on the screen it will show how much fuel is left. You can also select **AV/Gauges/Controls** from the Main screen, then **Engines** and look for **“Remaining”** to see how much fuel you have. This will let you know how much fuel to add to fill tank (i.e., if total fuel shows 110 gals then you need approximately 70 gals to fill the tank).

This is a good estimate, but actual amount may vary. Pay attention to sound of tank as you approach max fuel estimate. NOTE: If using Webasto Heater this will use diesel from Tank but will not be accounted for on total fuel used on gauges on Garmin. It is very efficient and uses around a gallon a day if used in the normal setting.

Place the DIESEL nozzle into the tank opening and pump slowly and evenly, and note the sound of the fuel flow. Pumping too fast may not allow enough time for air to escape, which may result in spouting from the tank opening. As the tank fills, the sound will rise in pitch or gurgle. Pay attention to the TANK OVERFLOW VENT on the outside of the hull near the tank opening. The sound may indicate that the tank is nearly full. Do not top off and be prepared to catch spilled fuel. **Spillage may result in a nasty fine from law enforcement.**

Replace tank cap. *Caution -- Clean up splatter and spillage immediately for environmental and health reasons. Wash hands with soap and water thoroughly.*

**Upon filling the MAIN diesel tank reset the GARMIN screen to the new amount as follows:
With ignition on(green light blinking)**

Home Page > AV/Gauges/Controls > Engine > Menu (bottom right of screen) > “Fuel added to boat” Enter the gallons added. or if filled up to full you can select **“Fill up all tanks”** and will reset to 180 gallons.

IF YOU DON’T ENTER THE FUEL ADDED ON THE GARMIN, THE READINGS WILL BE INACCURATE.

Note: Unlike automobile fuel gauges, fuel gauges on boats are notoriously inaccurate. Therefore, whenever the fuel level drops below half full, you should refuel at your next opportunity. NEVER let the fuel fall below 1/4th full or you are in danger of running out of fuel. (Towing, and the cost of a mechanic to bleed the air from the fuel lines, is an expensive proposition for a charter guest.)

BOAT ELECTRICAL

The electrical system is divided into two distribution systems: 110-volt AC and 12-volt DC.

The AC/DC ELECTRICAL PANEL is located in the aft of the mid-berth. Most switches on the panel board are labeled and are self-explanatory, but some circuits are unique. When not connected to shore power, batteries are providing all power. Therefore, monitor the use of onboard electricity carefully with the volt meter located on the aft wall of the mid-berth, and turn off electrical devices that are not needed.

110-Volt AC System

SHORE POWER supports all AC equipment and receptacles on board, as well as the battery charger. Before connecting to shore power, ensure the circuit breaker switch on the ELECTRICAL PANEL labeled AC MAIN is in the off position.

To connect to shore power, be sure the plug is completely dry and the breaker on the dock is OFF before starting this procedure. Plug the **30 amp** POWER CORD into the boat receptacle on the starboard cabin side. If the cord will not reach the dock receptacle from that location, you can plug into the cockpit receptacle, and then switch the selector under the cockpit bait well/cooler, on the port side to “Cockpit”. Check the power rating/plug size of the dock receptacle (that is 50-amp, 30-amp, 20-amp, or 15-amp). You can only plug a 30 amp plug into a 30-amp receptacle. There are two power adapters in case you are at a marina with 15- or 20-amp Power outlets. These adapters are in the port side lazarette. Cords coming off the bow can be wrapped loosely around the bow line. Plug into the dock receptacle, and then turn the dock power on.

At the ELECTRICAL PANEL, flip the AC MAIN breaker on.

If you do not have AC voltage showing on the AC Meter, check plug and ensure power breaker is on at dock side. Turn on desired outlets on panel.

If your outlets fail to work, check your GFIs to make sure that they have not been tripped.

After the Battery Charger circuit breaker has been turned on, turn the battery charger switch to the “Charge” position at the controller, located on the forward wall of mid-berth.

Watch the voltmeter for load. If the load exceeds voltage, you will trip a circuit breaker. If this occurs, wait to turn on one of your systems until your use of volts drop.

Should you detect the battery charger failing to charge the house batteries, check the battery charger switch is in charge position. Also, there is a circuit breaker located on top of the charger/inverter labeled Inverter Reset. this is located in the starboard lazarette.

Inverter Power

The INVERTER provides AC power to the 110-volt receptacle plugs and the microwave oven when the boat is disconnected from shore power. The inverter does not provide power to the battery charger. The inverter controller is the same one used for the battery charger. Place the switch in the down position to activate the Inverter. Make certain that it is on.

The inverter's power source is the DC house batteries located in the port lazarette. The quantity of DC power is limited to the capacity of the batteries. Therefore, running hair dryers, toaster, coffeepots, space heater, etc. will quickly discharge the house/inverter batteries. Use these items VERY SPARINGLY when not connected to shore power! Monitor your battery usage very carefully!

Note - Inverter does not operate water heater, but please leave water heater in the off position while on inverter power. Be sure to switch off inverter power before turning on A/C power. There is a safety switch for this but is best to not test it.

House (12-volt) System

There are a total of six batteries that support 12-volt DC power, four for the HOUSE, one for the THRUSTERS and one for ENGINE START.

Battery voltage can be checked on the gauge located on the Circuit Panel aft of the mid-berth. The HOUSE batteries, ENGINE START battery, and THRUSTERS battery banks are selected via a switch to determine voltage. #1 is the HOUSE batteries, #2 is the ENGINE START battery, and #3 is the THRUSTER battery. You should not discharge below 12 volts before you recharge the batteries by (a) running the main engine or (b) plugging in to shore power with the charger breaker on. Note - Battery status indicator is only effective when not on shore power.

BATTERY SWITCHES are in the starboard side lazarette. Under normal conditions, leave the top and bottom switches in the 'ON' position. ENGINE START and THRUSTER batteries should be turned on while preparing to get underway, and off when moored or anchored. The BATTERY PARALLEL switch should be off except to boost the ENGINE START battery.

Note-- Do not change the position of the switches while the engines are running, or the alternator diodes will be damaged. Change positions with the engines off.

Your 12-volt panel shows all the systems supported by your batteries. Primarily you will be turning on the breakers for your lights, water pressure, electronics etc. Bilge Pump and Holding Tank circuits are for manual operation and should otherwise be left in the OFF position. (Bilge pumps are automatic and these switches are for manual override).

House Battery Bank & Switch

The HOUSE BATTERY BANK provides power for all DC systems, except the engines and automatic bilge pumps. When disconnected from shore power, all 12-volt devices drain the HOUSE battery. Use devices as needed. The Battery monitor is the most accurate telling battery life. It is like a fuel gauge for your batteries.

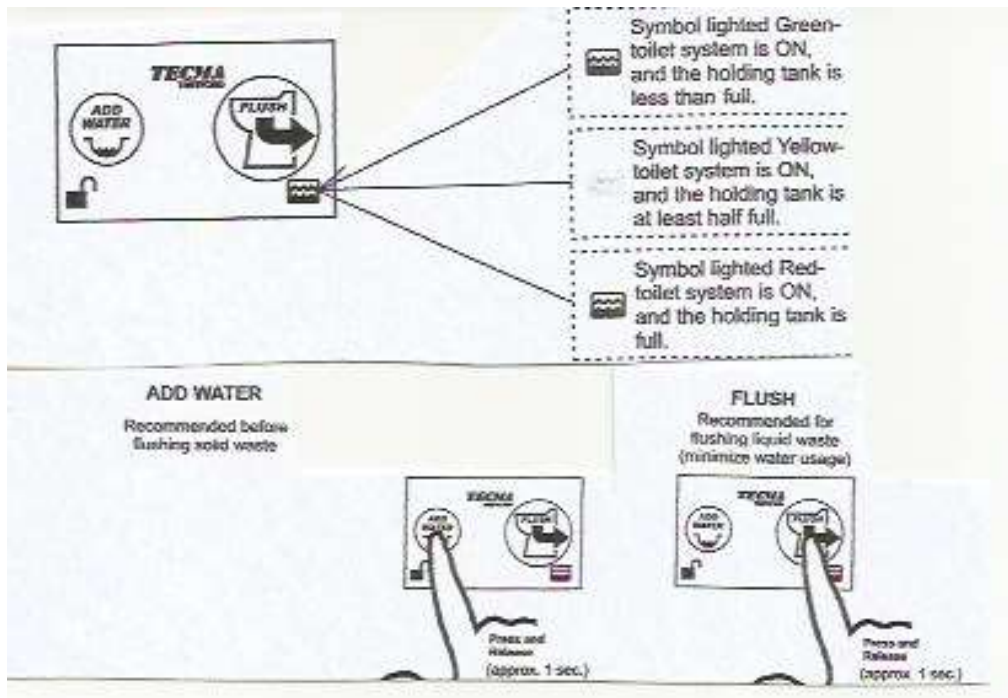
When a battery bank is being charged, the voltage will read from about 13.1 volts to 14.4 volts depending upon state-of-charge of the battery bank. When the battery bank is not being charged, the voltmeter can give a rough indication of the state-of-charge of the battery bank.

Voltage (AGM Battery)	Battery State
13.5 volts	100%
12.47 volts	75%
12.25 volts	50%
11.95 volts	25%
11.70 volts	0%

All batteries are charged by the engine ALTERNATOR while underway, and by the BATTERY CHARGER when connected to shore power. The Solar Panel will also charge the Engine and House batteries automatically.

Battery Parallel Switch

Should the ENGINE battery be insufficiently charged to start the engine, the HOUSE/THRUSTER batteries may be momentarily connected to provide a boost. Turn the BATTERY PARALLEL SWITCH located in the port side lazarette to the PARALLEL 1, 2 or Both positions. Return the BATTERY PARALLEL SWITCH to the “off” position after the engine starts.



SANITATION SYSTEM

Marine Toilet

It is important that every member of the crew be informed on the proper use of the MARINE TOILET. The valves, openings, and pumps are small and may clog easily.

If the toilet clogs, it is **YOUR RESPONSIBILITY!**

Always pump the head for children, so you can make sure nothing foreign is being flushed.

Caution – *Never put paper towels, tampons, Kleenex, sanitary napkins, household toilet paper, or food into the marine toilet. Use only the special dissolving marine toilet tissue provided by AYC. DO not rely on the colored indicators they often are not reliable.*

To operate hold large button for 1 sec to flush liquids, if flushing solids first push ‘add water’ and then flush. Monitor system with icon on lower right per chart below. System will go to sleep after 8 hours of no operation but will turn back on after pushing button.

Note that a Red Icon on lower-right corner means you need to seek a pump out.

BLONDIE has a 40-gallon holding tank, and it will need to be emptied approximately after 35 flushes. The tank level is displayed on the toilet flush panel. (Green = empty, Orange = half full, Red = pump out) The lights on the toilet panel will time out and go dark to save energy if they have not been used recently. If dark, touch the button to activate.

If the toilet pump starts to resist your flushing efforts, STOP!! Exploding or leaking sewage is most unpleasant!! Search out the problem and correct it.

Holding Tank

The HOLDING TANK holds approximately 40 gallons and is located under the forward stateroom bed. Be aware of the rate of waste production (about 1 gallon per flush). With an overfilled tank, it is possible to break a hose, clog a vent, or burst the tank. The result will be indescribable catastrophe and an EXPENSIVE FIX for you. Empty the tank after approximately 35 flushes to avoid this problem.

At the Marine Pump-Out Station, remove the WASTE fitting, located on starboard deck using the deck fitting key. Insert the pump-out nozzle into the waste opening. Double-check that it is the WASTE fitting! Turn on the pump and open the valve located on the handle. When pumping is finished, close the lever on the handle and turn off the pump. Remove the nozzle from deck fitting.

If there is fresh water on the dock, please rinse the tank by adding 2 minutes (about 5 gallons) of water through the deck fitting and into tank. Then pump it out again to leave the tank rinsed. Thank you! This will also eliminate head odors. NOTE – Do not use the white hoses for this. Cross-contamination could result.

BLONDIE has a macerator pump to push waste out of the discharge port on the port side. Pumping waste overboard is not legal in US waters, and is discouraged, and may be restricted in some Canadian areas.

If you must pump overboard, and you are in an area where you can legally do so, open the overboard discharge valve located under mattress of the main berth bed. The valve is secured with wire ties per U.S. Coast Guard rules and must be secured again when you return to U.S. waters. With the valve open, activate the switch on the forward helm labeled **Macerator**... When finished pumping close the valve.

WATER SYSTEM

Fresh Water Tank

The FRESH WATER TANK holds 60-gallons of water. Monitor the level by looking at the water gauge located on the electrical panel near aft wall near stove.

The water fill is on the deck at the beam on the port side with a cap marked WATER. Avoid flushing debris from the deck into the tank opening. **DO NOT fill water and diesel at the same time! The freshwater hoses for filling the tank are in a bin in the aft rear hatch.**

State Parks have no pressurized water to refill tanks, but all points of civilization do. If your crew does not let the water run continuously while they brush their teeth, shave, or shower, you shouldn't have to refill too often.

Fresh Water Pressure Pump

Turn on the pump with switch on breaker panel. If the water pump runs continuously, you are either out of water or may have an air lock and need to bleed the system by opening up a faucet. If you lose pressure on the kitchen faucet then unscrew the pullout handle and check the screen for debris. If you run out of water **SHUT OFF YOUR WATER HEATER** on the AC panel. Serious damage to the water heater can occur!

Hot Water Tank

The WATER HEATER has an 11-gallon capacity tank. It is available when connected to shore power or via heat exchanger while underway.

When on shore power you can heat the water electrically by turning the WATER HEATER switch on the A/C Panel to the “on” position. It takes about an hour to heat the water electrically. When disconnecting from shore power, **BE SURE TO TURN OFF** Water Heater on the A/C Panel. Do not use the water heater with the Inverter or if the water tank level is exceptionally low as it can cause serious damage to the water heater.

The water is also heated by engine heat when the engine is running. It takes about 15 minutes of running the engine under load to get the water hot.

CAUTION: The engine heats water to scalding temperatures!! Please be CAREFUL!!

Shower

Before taking a SHOWER, make sure the Water Pressure breaker is on. The sump pump for the shower is automatic. Take only short “boat” showers (turning off water between soaping up and rinsing). To keep shower tidy, wipe down the shower stall and floor. Check for accumulation of hair in the shower and sink drains.

There is a freshwater shower with hot and cold water located at the entry of the boat near swim step. This is an ideal way to rinse off salt after a swim or take a shower outdoors on a sunny day. Ensure that the faucets and nozzle are completely off after use.

Additionally, a SALTWATER WASH-DOWN is available from a hose spigot in the cockpit. Only use saltwater washdown out on the swim step. This is an ideal way to wash off sand or mud, and to clean the dingy, without wasting fresh water. To activate, flip the PUMP ROCKER SWITCH located port side of the rear transom in the cockpit. If no water flows, check the valve at the aft end of the engine compartment. After use, ensure no object leans on the switch to turn it on accidentally. Hose is located in starboard lazarette. Also check to make sure thru hull valve is open.

GALLEY

Sink

Be sure to insert the drain stopper when washing dishes as pipes can clog easily with food. If this occurs, try using the plunger located behind the head.

Stove/Oven

The stove and oven are powered by propane. The propane tank is located in a container on the rear swim step. The valve is normally left open.

The propane feed is controlled by the propane fume detector/automatic safety solenoid valve located left of the drawers aft of stove. Ensure the green "Power on" light is illuminated at the valve controller. Turn on the safety solenoid by pressing the valve "on/off" button on the valve controller. A second green lamp should come on.

STOVE TOP:

- To light the stove push in the control knob that corresponds to the burner you are lighting and turn counter-clockwise 90 degrees.
- Continue pushing the control knob in while pushing the ignition button located on the left side of the control panel. (There will be a spark at all the burners)
- Once the burner is lit, continue to hold the control knob in for 20 seconds to allow the thermal coupler to heat up and energize the solenoid inside the valve.
- Turn the control knob counterclockwise to adjust the output down.
- To turn the burner off, turn the control knob clockwise to the off position.

If the burner fails to light from the electronic spark system, turn off the burner for 1 minute to allow the gas to dissipate. Relight using a match or butane lighter.

OVEN:

The oven and broiler CANNOT be used at the same time. The oven should be preheated for 10 minutes to achieve a stable temperature.

- To light the oven, push in the control knob and turn counterclockwise to the desired temperature setting. Continue pushing the control knob in while pushing the ignition button located on left side of the control panel.
- Once the burner is lit continue to hold the control knob in for 20 seconds to allow the thermal coupler to heat up and energize the solenoid inside the valve. The ignition will continue to spark while you hold in the control knob.

BROILER:

- To light the broiler, push in the oven control knob and turn clockwise.

- Continue pushing the control knob in while pushing the ignition button located on the left side of the control panel.
- Once the burner is lit continue to hold the control knob in for 20 seconds to allow the thermal coupler to heat up and energize the solenoid inside the valve.

WARNING: Broiling is a rapid heating process. Broil with the oven door open. Do not operate the broiler for more than 20 minutes at a time.

WHEN FINISHED USING Stove or Oven TURN OFF THE SAFTY SOLENOID VALVE.

Refrigerator/Freezer

BLONDIE is equipped with two fridges, one inside the cockpit and one in the port side lazarette. Power is toggled via a switch inside the units. Each fridge is equipped with an individual temperature dial. Ideal setting is between 3 - 3.5. There is a small freezer compartment inside the refrigerator. Monitor the use of the refrigerator when the engines are not charging the 12-volt battery system. If not on shore power, it is suggested you switch off the Refrigerator in the evening to conserve batteries.

Wine/Beverage Cooler

The Wine/Beverage cooler is powered by the same DC circuit as the refrigerator. Temp will be slightly cooler on bottom shelves. The wine cooler really drains the power so you might want to shut off if you're on the hook or without shore power.

Microwave

The Microwave is powered on at the 120-volt AC panel. When on inverter power it is important to use the microwave conservatively as it uses a significant amount of electricity.

BERTHS

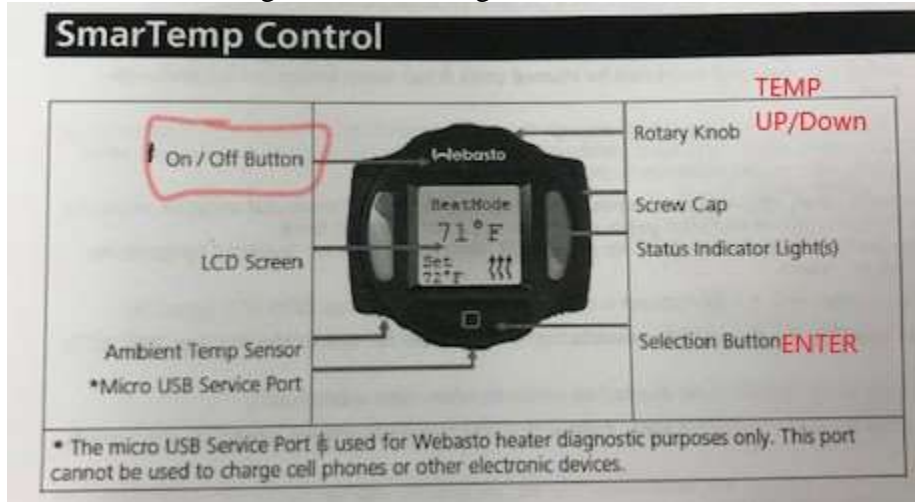
BLONDIE will sleep a maximum of six people – two in the forward cabin, two in the mid-berth, and two on the drop down dinette, however we recommend the dinette berth be used only for children.

Converting the Dinette into a Double Bed

This works best with two people; unlatch both black latches on the center post. Move the handle on the aft side of the table to port to adjust the tabletop fore and aft to align with the support rails adjacent to the cushions. Push down on the tabletop directly above the center post. Once the table is full down to the support rails, re-latch the black latches on the post. The tabletop cushion is stored in the foot of the mid-berth.

HEATING SYSTEM

BLONDIE has two types of heating systems, the diesel-fired Webasto furnace and the Heatercraft main engine heat exchange



Webasto Diesel-Fired Heater (DC)

The WEBASTO DIESEL-FIRED FORCED-AIR FURNACE controller is located on the wall behind salon seat and provides heat in the same way as a household furnace. By pressing the main switch where it says Webastco On/Off the heater is activated and the indicator ON / Status lights to confirm activation. By pressing On/Off switch again the heater operation is stopped after a approximate 3 min cooling down process. **Do not shut off house battery until Webastco has cooled down.**

With the rotary knob you can select the desired temp up or down and then hit the selection button marked with a small square at bottom of unit, press as the enter button. To shut off press Webastco button and unit will shut off after a cool down.

Check the furnace **EXHAUST PORT located on the port side** on the beam for any obstruction such as fenders or lines. Do not block this opening when operating the furnace. Heat from the exhaust will damage fiberglass and melt rubber. Once it is on, allow it to run for at least 15 minutes before turning it off.

HEATERCRAFT Engine Heat (DC)

BLONDIE also has a HEATERCRAFT heater that utilizes the main engine cooling system to heat the main cabin while underway. The engine provides heat in the same way as a car heater. The controller is located on the starboard side of the helm. The temperature is constant, but the airflow is controlled by a three speed fan control (low, medium, high).

ELECTRONICS

All electronic manuals are located in a Ranger Tug case located under the v-berth. These are also available electronically in a searchable format within the Garmin navigation system.

Depth Sounder

The GARMIN digital DEPTH SOUNDER will not give accurate readings beyond 400 feet. In deeper water, the sensitivity on the unit increases as the transducer tries to get readings back. Consequently, you will receive many false readings caused by currents, changes in water temperature, fish, and seaweed. Use the depth sounder only as an aid to navigation in shallow water. Note - the depth shown is the depth below the keel. **BLONDIE** draws approximately 3'.

IMPORTANT: The key to avoiding rocks is NOT the depth sounder – but knowing where you are always. (Rocks are the greatest navigational and safety hazard in the Islands – but most are clearly marked on the charts.)

We do not recommend using the depth sounder alarm during the night. It is likely to sound at inappropriate times such as late at night while fish are passing under the transducer. (Instead consult the onboard tide data, or the Tides & Currents booklet on board, to determine whether you are anchored in a safe location, considering how shallow your depth will become when the tide ebbs out of the anchorage in the middle of the night.)

*Remember to **ALWAYS** consult your charts for depth!*

Chart Plotter & Radar

The GARMIN GPS map uses a touch screen. The GPS/chart plotter/radar is an all-in-one screen. It is very simple to use. The Operating Manual can be found on the **information** tab on home screen of chart plotter, in case you want to make use of the more sophisticated features. The basic operation is to turn it on (press and hold power button for five seconds, located in the top right corner), select the chart screen and go. Zoom, moving around on the screen, are via touch screen buttons.

With the chart plotter, you can zoom-in to make something that is the size of a dime on a paper chart the size of a paperback novel or larger. You can see more detail and more importantly any hazards in the area. Your boats position on the chart plotter is accurate to within 3 meters (about 10-feet). Check the Chart-Plotter or paper charts frequently to ensure you are where you think you are. If someone asks, “where are you?” you need to be able to point to the chart within a few seconds and show them the vessels precise position. If you can’t, you are in danger of hitting a rock.

You should have little need of the radar except for the highly unlikely event that you are suddenly enveloped by fog, which is rare in this area. The fog typically encountered in this area forms in the wee hours of the morning and usually burns off by mid-day. Never depart a safe location into the fog!! To do so, even with radar, is contrary to prudent seamanship. FYI, Fog becomes

“reduced visibility” when you can see ¼ mile, about 500 yards, in all directions. It is safe to proceed CAREFULLY in reduced visibility, using your radar to see beyond the haze, but be sure to look up from the screen about every 10 seconds and use your eyes to scan the horizon forward, behind and side-to-side. A motor yacht, tanker or freighter traveling at 20 knots takes only 39 seconds to travel ¼ mile!! You need to see fast moving vessels sooner rather than later so you can prepare to quickly take evasive action to avoid a collision. The radar must be turned on from the HOME screen. It can either overlay the chart or be on a split screen.

VHF RADIO

Push and hold the red on/off button until the radio comes on. **The command bridge radio is in shelf above main helm.**

You are required to monitor Channel 16 by the USCG (the hailing and distress channel) during your cruise. After establishing contact on channel 16, switch to working channels 68, 69, or 80. Scan the weather channels for the one with the best reception before sailing in the morning and prior to anchoring for the evening. This is generally a light wind region, but weather changes can be sudden. Listen for the “inland waters of western Washington” or “Camano Island to Point Roberts”. Both cover the San Juan Islands. You will also hear “Strait of Juan de Fuca” (south of the San Juan’s), “Georgia Strait” (north), and Rosario Strait (runs through the eastern part of the San Juan Islands).

In an emergency, if you don’t have time to talk on the radio, you can send an automated distress call by pushing and holding the distress button under the red plastic flap. This feature is tied into the GPS and will automatically send your location with the distress call.

KNOT METER

GPS input to the chart plotter provides an alternate and quite accurate indication of SOG (speed over ground).

DC HELM PANEL

Several functions including horn, running lights, anchor light, and windshield wipers are controller by rocker switches on the panel located on the helm adjacent to the wheel.

NAVIGATION LIGHTS

A three-position rocker switch with **NAV LIGHTS** on when the switch is moved to the top position and **ANCHOR LIGHT** on when the switch is moved to the bottom position. The middle position is the OFF position.

HORN

Right hand rocker switch operates the electric horn.

SEARCH LIGHT

The directional pad to control the searchlight is above the helm station.

OTHER INSTRUMENTS

GARMIN integrated Autopilot with remote and Volvo Penta engine operating system.

ENTERTAINMENT SYSTEMS

AM/FM Stereo Receiver/CD Player with MP3 - Salon

The Fusion AM/FM stereo receiver/CD player with MP3 is located in the Main Berth above Port side shelf as you enter the Main Berth. It operates like a normal car radio and works with most Bluetooth devices. There are four sets of stereo speakers on *BLONDIE* located in the salon, the outside cockpit and the forward stateroom and Command Bridge. Each set of speakers can be independently controlled from the forward stateroom panel. Press the red Fusion button to power the unit on or off.

TV & DVD - Salon

The salon is equipped with a 19" LCD TV. It drops down on a spring-loaded lever. Simply push in on the lever and pull down the TV until it sets in place. The remote control for this TV is in the shelf above the dinette table. A limited number of TV channels are available throughout the islands. You can also duplicate the GPS Navigation screen onto the TV by going to Source button on the TV remote and selecting PC mode. To replace TV in the Up mode, depress the spring lever and push TV up until it clicks into place.

TV & DVD/CD/AM-FM and iPod Aux Receiver – Forward Stateroom

BLONDIE also has a 22" LCD TV/DVD mounted in the forward stateroom. It works the same as the saloon TV. Remotes are in the nightstand on the port side of bed. You can also adjust each speaker station independently from the Stateroom Fusion controller by pushing the main knob, then turn and select desired location, then push again and adjust up or down accordingly. To power off or on, push the Red Fusion button.

ANCHORING

BLONDIE is equipped with two anchors, one forward and one in the port lazarette.

The primary WORKING ANCHOR is a LEWMAR 22 Lb. claw anchor and is attached to a 50 ft chain and 200 ft nylon rode passed through the deck from the ANCHOR LOCKER. The locker can be accessed at the bow. There is an Anchor shock line, consult manual in brief case with manuals if instructions needed. This will make for a quieter night on anchor and better anchor hold.

The scope to use in the Islands is 5-to-1 measured from the deck to the bottom. Most coves are 15-30 feet deep, so expect to pay out about 75-150 feet of rode. After you have paid out the suitable amount of rode, a couple short bursts in reverse (*idle speed*) sets the anchor and tests its holding power. If lots of boats in an anchorage you may only get 2-to-1 or 3-to-1.

For storm conditions, extend scope to 7 or 10-to-1 (200' in 20' of water), provided you have room to leeward. Otherwise, set two bow anchors (using the secondary anchor, chain and rode) in a V-type pattern for extra holding power. The secondary anchor and rode is located in the starboard lazarette.

Anchor Windlass

Power is received from the ENGINE START battery. Always operate the windlass while the engine is running! Otherwise, the windlass will drain the START battery. The breaker/fuse for the windlass circuit is in the cabinet in main berth, top door behind the steering station accessed from the forward stateroom. The up-down controller for the windlass is located on the foot pedals at the bow adjacent to the anchor and very conveniently, on the control panel to the right of the steering wheel.

Deploying the Anchor:

Come to a complete stop before releasing the anchor from the bow. The anchor is secured from premature deployment by tying of chain to anchor cleat, there also is a u shaped brace in front of anchor. Pull up on the U-shaped bar before deploying anchor otherwise it will not release. Then open the covers on the FOOT PEDAL CONTROLS and tap on the Down button to gently ease the anchor off the roller and through U bar. Once the anchor is free you can begin to slowly lower the anchor down into the water through the use of the Down foot control. If necessary, guide the anchor over the anchor roller to prevent binding on the pulpit.

Determine the depth and let out enough chain to let the anchor hit the bottom. Inform the helmsman to reverse the engine, in idle only, and payout the chain and rode until you reach the desired scope (usually 5 to 1). Make sure to take into account the tide and how much the water will rise and fall.

Secure the rope rode to the forward cleat, and then ease the windlass out enough to put some slack in the rode. The windlass is not designed to take the load of an anchored boat. Using a combination

of reverse and neutral, gently tug on the anchor until it is set. Perform an anchor watch for about 30-minutes and you should sleep well.

Retrieving the Anchor:

Always retrieve anchor from the bow of the boat not the helm. When retrieving the anchor, **NEVER** use the windlass to pull the boat forward to where the anchor is set. The windlass is not designed for this and there will be a large draw on the batteries and can cause serious damage to the windlass base. Instead, head the boat under power toward the anchor while using the windlass to take up the slack in the chain/rode. **Take your time**, otherwise the anchor chain/rode will bunch up under the windlass and you will need to push it down to the bottom of the chain locker to prevent the chain from jamming in the windlass. Give the windlass short rests as you are pulling up the anchor. Place yourself in position to guide the anchor onto the roller. As the anchor rises, be careful to not allow the anchor to swing against the hull.

Note - Should the chain/rode start to slip on the Windlass when retrieving the anchor, you may need to tighten the Windlass clutch by using the Windlass wrench located in the Anchor Chain Locker at the bow. **Also be sure to close covers for windlass switch so you don't hit on accident and pinch your hands.**

Securing the Anchor:

Once the anchor gets up to the bow roller it should roll over and up through the anchor roller. You may need to guide it up through the U bracket and into the anchor holder. Chain should be taught (but not overly tight) and the U shaped loop flipped down to secure the anchor. Close the covers on the FOOT PEDAL CONTROLS.

Mooring Buoys

The State Parks Sticker on your vessel allows you to pick up the MOORING BUOYS, or tie up to docks in the parks for free. You only need to register at the kiosk usually located at the heads of the docks. Mooring buoys have a metal triangle at the top upon which is a metal ring. The metal ring is attached to the chain which is anchored to the bottom. IT IS VERY HEAVY. The strongest member of your crew should be picked for this job.

Approach the buoy into the wind as you would for anchoring. Have crew members on the bow, one with a boat hook and one with a mooring line secured like a bow line. As you are coming slowly up to the buoy, have the crew member holding the boat hook point at the buoy with the hook so the skipper always knows where it is. Hook the buoy and bring the ring up to the boat to allow the second crew member to thread the line through the ring. Release the hold with the boat hook. If your mooring line is led out the starboard chock, bring the end of the line back through the port side. You will essentially create a bridle with about 10 feet of slack from the chock to the buoy.

BARBECUE

The BARBECUE is located on port side stern rail. You will find the regulator in the drawer in the galley. Please make sure to return to that location after each use so it is not lost overboard. Make sure nothing else falls overboard. Make sure the BBQ is level.

To use the BBQ, attach the regulator to the BBQ. It fits loosely to allow air to flow around the gas nozzle. Next, attach a PROPANE BOTTLE to the REGULATOR and carefully light the unit, with the button ignitor or butane lighter. The barbecue generates a lot of heat and cooks hot and fast. As a courtesy to the next guests, please use the wire brush to clean the BBQ after each use. The wire brush is stowed in the aft cabinet along with the BBQ tools. When finished, let the BBQ cool down, then place cover securely around BBQ.

Caution -- For safety reasons, do not store propane inside the boat or in the engine compartment. Propane canisters may leak slightly once opened and propane gas could settle into low spaces. Store these bottles in the swim step locker or Helm cabinets. Ensure flammable materials are not near the barbecue.

DINGHY & OUTBOARD MOTOR

BLONDIE has a 10' RIB DINGHY with a 2.3 Honda Outboard. As you can see, the dinghy is mounted on the back of the swim platform and is deployed/recovered with the use of Weaver Davits.

TO DEPLOY THE DINGHY

Release the two Stand Off clips that hold the dinghy to the transom of **BLONDIE** untie **the dinghy rope attached to the rear railing and gently lower the dinghy into the water. The dinghy will still be attached to the swim step with the davit clips. You can either release these now and tie up the dinghy or leave them attached until you are ready to go. You can also lower with the winch.**

Use the oars attached to the dinghy or the outboard motor attached to the rear railing. The outboard is secured to a bracket on the railing when not in use. To mount the motor to the dinghy, unscrew and lift the engine off the bracket and onto the transom of the dinghy. Use caution and be sure to be well balanced to prevent dropping the motor or falling overboard. Position the outboard in the center of the transom and then tighten the screw clamps by hand to secure the outboard to the dinghy.

The Honda outboard has a self-contained fuel tank that holds approximately **.35 gallon of gasoline (NOT DIESEL). A full tank of gas will allow the engine to be operated for 30-40 minutes. There is a spare 1.25-gal gas can pre-filled in the storage bin on the swim step.**

TO OPERATE THE OUTBOARD

- 1) Rotate the Air Vent valve, align the pointer to the OPEN position, to open the vent.
- 2) Turn the Fuel Cock Lever, to the down position for built in fuel tank (ON position). Wait 15 seconds for fuel to flow to the carburetor.
- 3) Make sure the Emergency Stop Lock Plate is in place and the cord is fastened to your wrist, belt, life vest strap or clothing. (A spare lock plate is in the Zip-lock bag in the black Ranger Tugs briefcase);
- 4) Pull the Choke Knob on the front of the engine fully out. Note - If the engine is still warm from previous use, do not set the choke.
- 5) Turn the throttle grip, to the START position (Just past the gap in the white line);
- 6) Pull the Starter Grip slowly until resistance is felt. When you feel it engage, pull sharply to start the engine. Do not release the rope when it is pulled out. Allow it to recoil slowly.
- 7) When the engine has started, use the Throttle Control Grip to bring the engine to idle.
- 8) Push the Choke Knob in.
- 9) Warm up the motor for about 5 minutes.

The motor will go when you apply the throttle, to reverse spin motor around.

To STOP the engine, reduce the engine speed to idling rpm and push the red Stop Button on the control handle until the engine stops completely. Be sure to close the Fuel Cock and Air Vent Screw on the Fuel Tank Cap when you are finished using the engine.

To raise the motor, reduce speed to IDLE, Turn the Fuel Cock Lever to OFF and close the Fuel Vent valve on the Fuel Cap. Raise the motor until it locks in place.

To lower the motor into the water, pull it slightly toward you, then release the Tilt Up Lock Arm located just above the Mounting Bracket.

Coast Guard regulations state that any child 14 and under must wear a life jacket in a dinghy. It is a good idea for EVERYONE to follow this rule. Oars are mounted on the dinghy if needed.

Please take special care when beaching the dinghy. Most of the beaches you will land on are strewn with barnacle-covered bottom damaging rocks. When approaching the shore, weigh the dinghy aft by leaning or moving the crew toward that back of the dinghy. Then off-load everyone over the bow. Also remember to secure the painter under a large rock or to a large driftwood log so the dinghy won't float away should the tide rise while you are ashore.

If you decide to tow the dinghy at any time please go slow and always keep it tight to the boat any time that you slow down or stop, Assign one of your crew members as the “dinghy” person to be responsible for taking up slack. You don’t want to wrap a propeller.

TO RECOVER THE DINGHY

Bring the dinghy to the swim platform on the side with the davit clips (portside) and then attach the clips. Carefully unscrew the motor from the dinghy transom and lift it off the transom and onto the outboard bracket on the swim step rail. Be sure to place the motor on the inside of the railing to leave room for the dinghy. Tighten the clamp screws by hand, but do not over-tighten as the bracket is made of plastic and will crack if you over-do-it.

Now to raise the dinghy, you have two choices. Two people may be able to raise the boat manually with lines to the outside sponson. Once raised, attach the standoff clips remove the lines.

If this is too much, then you can use the come-a-long system that attaches to the bracket ton the above yawning. The come-a-long is located in the cockpit locker under the sink. You will need to release the come-a-long to allow the line to be pulled all the way out and then attach the carabiner at the end of the line to the metal ring on the outside of the dinghy. Switch the come-a-long to retrieve mode and ratchet the rope up until you can manually pull the dinghy back into place to attach the standoff clips.

CRABBING & FISHING

The Crab Trap is secured to the Top Cabin Deck with bungee cords. Always check the fishing and crabbing requirements before you leave on your cruise. You will need a license. Many areas are CLOSED to crabbing and fishing during certain months.

Use caution when placing and retrieving crab traps! Lines can get wrapped around props. Fish-flavored cat food with the pop-up ringed lids work best for a nice neat way to bait the trap. After 30 minutes, or up to 12 hours, retrieve the crab trap. Measure the crab using the CRAB MEASURING GAUGE attached to the crab trap. Keep male crabs of proper size (usually 6 ¼ inches across the carapace). Boil crabs about 12 minutes to cook.

After using, wash equipment thoroughly with fresh water (available from the cockpit shower faucet) and replace on top of the Cabin Deck. *Note -- Please do not store wet traps and gear inside the boat.*

VISITING CANADA

Canada has some great cruising areas. If cruising into Canada, you must have a valid passport. You must check in with Canadian Customs as soon as possible after entering Canadian waters. Once you've cleared customs, you should fly the Canadian courtesy flag from the Starboard Yardarm. The flag is in the overhead pilothouse cubby. A flag clip is attached to the yardarm on the mast. Once the flag is attached to the clip, the line should be secured to the cleat next to the GPS antenna. The Canadian flag should be bestowed upon returning to the U.S. You must check in with U.S. Customs.

OTHER: Safety & Bilge Pumps

SAFETY should be paramount in your daily cruising. A MAN OVERBOARD DRILL should be discussed and perhaps even practiced with a life jacket. Know where you have staged your life jackets. Your flares and safety equipment are also located in port side lazarette.

Please check the bilge twice each day, morning and evening. The bilge area is accessed easily by lifting the engine hatch and looking at the area behind the transmission and under the shaft. **BLONDIE** is equipped with **electric on-demand** AUTOMATIC BILGE PUMPS, with circuit breakers at the DC Panel located on the aft wall of the settee. The ON position at the breaker panel is the MANUAL ON mode and will run continuously until switched off. The OFF position at the circuit breaker is the AUTOMATIC position and will cause the pump to be controlled by the sensors. Please keep the circuit breakers in the **OFF** position unless it is necessary to override in MANUAL mode. You may occasionally hear the pump operate due to condensation and water from the shaft log accumulating in the bilge.

Flares -

Visual day/night distress signals are located in the bottom of the port side lazarette. Please locate them now so that you know where they are before you need them. **Fire**

Extinguishers -

There are three fire extinguishers on **BLONDIE**. One is mounted in the mid-berth and one in the forward stateroom and one at door in main cabin.

Life Jackets

Four adult life vests and two child's size are located in the port side lazarette.

Throwable Floating Seat Cushion -

A throwable floating seat cushion is in the port side lazarette.

ENGINE SPARES are stowed in the forward stateroom, under the forward cushion of the bed. This includes an oil filter, raw water impeller, pump parts, injectors, belts, and other small parts.

THROUGH-HULL LOCATION

There is one below waterline through-hull fitting. It is under the boat, adjacent to the Engine Compartment, and feeds the Sea Strainer. It is controlled by a valve labeled “SEACOCK” on the starboard side of the engine compartment.

The other is the salt-water washdown through-hull, located on the port side of the engine compartment.

R31 Fuse Block Layouts

Dash #1



Dash #2



House Battery



Optional: Flybridge



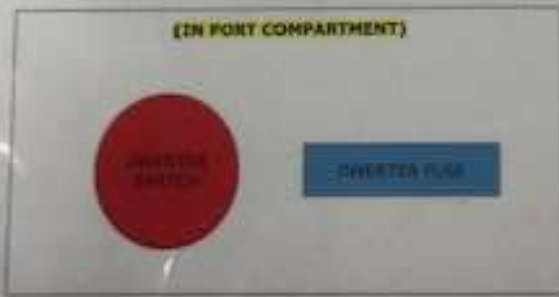
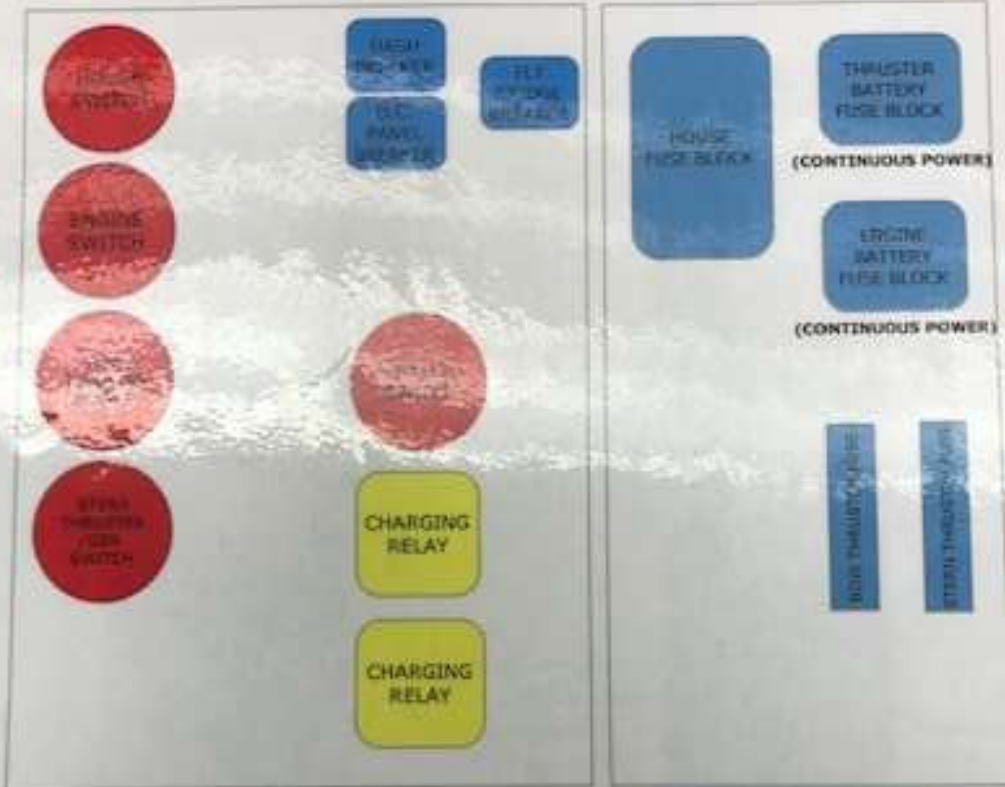
Engine Battery



Thruster Battery



R-31 POWER DISTRIBUTION PANEL



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