# “Change of Latitude”

**A 42’ Grand Banks Classic Yacht**

Operating Manual

Updated May 26, 2016

Copyrighted. See notice next page.

<table>
<thead>
<tr>
<th>Section</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction &amp; General Boat Description</td>
</tr>
<tr>
<td>2</td>
<td>Important Vessel Numbers</td>
</tr>
<tr>
<td>3</td>
<td>Operating Checklists &amp; Maneuvering Suggestions</td>
</tr>
<tr>
<td>4</td>
<td>Specific Discussion of Boat Systems</td>
</tr>
<tr>
<td>5</td>
<td>“What to Do” for Some Specific Concerns</td>
</tr>
<tr>
<td>6</td>
<td><strong>EMERGENCY PROCEDURES</strong></td>
</tr>
<tr>
<td>7</td>
<td>Index</td>
</tr>
</tbody>
</table>
**Warning!**

This notice is a part of this manual, and is placed here to warn you as an owner, crew member or passenger on this vessel that the author of this manual assumes no responsibility for any errors or omissions herein, and represents only that the writings and illustrations herein represent his “best efforts” to provide a comprehensive overview of the vessel, so that it can be operated by a person who has the necessary experience and/or training to operate such a vessel given the additional information herein.

You should be aware that this operating manual is provided as a convenience to the owner(s), crew members and passengers on this vessel, and is not complete in every detail. Given the complexity of this boat and its systems, there is no way that all conditions, contingencies, and operating details can be covered, both because of space limitations and because of ordinary oversight as contingencies are speculated upon by the author. Likewise, it is possible either through oversight and/or changes in the vessel as a result of additions, modifications, or deletions to or of equipment since publication of this manual, that items discussed will operate differently than described, be absent from the vessel, or be added to the vessel without discussion in this volume.

As a vessel owner, crew member or passenger on this vessel, you are here at your own risk, and the author of this manual has no responsibility for your actions whatsoever. If you do not feel competent to undertake any or all operations detailed herein, do not undertake it/them; get help from a competent person.

I thank you, (and our lawyer thanks you.)

---

**Copyright 2013 Joseph D. Coons & NW Explorations LLC**

This manual was originally written for this boat’s owner and it’s charter company by Joseph D. Coons, 1220 Birch Falls Drive, Bellingham, WA 98229, tel (360) 647-0288. All rights reserved. This manual may not be quoted, copied, or duplicated, in whole or in part, in printed or electronic form, without express written consent from the author or his assignee. All rights assigned to NW Explorations LLC.

---

**About the Original Author**

Joe Coons is a retired AM-FM broadcasting station owner and computer systems corporate executive who throughout his life was involved in communications and mechanical, electrical, and electronic systems. He cruised his own boat on the Hudson River and Lake Champlain when a teen and in his early twenties, and during the 70’s and 80’s accumulated some 2,500 hours as an instrument-rated private pilot. Beginning in 1986 he became seriously involved in boating as a boat owner, subsequently working in a “retirement career” as a broker, also commissioning vessels, operating a charter fleet, checking out boat charterers, and training new power boaters. He has held a 50-ton Coast Guard Master’s license, and operated his own boats and a substantial number of others from 26 to 70 feet in the near-coastal waters of Washington State, British Columbia, and Alaska. His “helm time” exceeds 8,000 hours. In addition, he has trained hundreds of boaters in the skills of vessel operation.
THINGS TO KNOW ABOUT CHANGE OF LATITUDE

1. Under-settee Storage In Main Salon:
   Please lower the salon table to cocktail height before accessing the under-settee storage. Opening the second seat from the bow with the table at dining height hits the table base and nicks the table edge. To open the corner seat, first lower the table, then open the second seat from the bow, and only then open the corner seat. This avoids tearing the fabric.

2. Refrigerators:
   Cold plate refrigerators require AC power. This means that their temperature fluctuates, getting warmer when not connected to shore power or running the generator. We find that running the generator a couple of hours in the morning and a couple of hours in the afternoon/evening, when not on shore power, keeps the temps at an acceptable level.

3. Simrad Plotter:
   For the plotter to work, both the Plotter and Radar breakers need to be turned on in the DC electrical panel.

   To set the anchor circle/alarm, press GO TO and then 5 (on the buttons to the right of the Simrad screen) as you drop the anchor. The circle is set at 300 feet, the length of our chain. If you drag out of the circle, an alarm sounds. The alarm is not very loud, so if conditions are very rough, you may want to have someone monitor the screen periodically. To remove the anchor circle alarm, press GO TO and then 3 when you’re ready to raise the anchor.

   If you leave the Simrad plotter on overnight to monitor the anchor circle, you can reduce glare and power use by pressing PWR, then 4, then ENT (on the buttons to the right of the Simrad screen). This darkens the screen to night time mode. To revert to daytime mode, press PWR, then 1, then ENT.

4. Hurricane Furnace:
   Our furnace is located in the lazarette. Therefore, it heats the cabins from back to front. From a cold start – when the engines aren’t running - it takes about 15 minutes for the circulating water to get hot enough for the blowers to send out heat. We tend to turn the heat down when we go to bed to reduce the noise of the heater cycling on and off during the night.

5. Sunscreens:
   There are rolls of black sunscreens under the flybridge settee. They snap onto the outside of the salon windows. They’re great on hot and sunny days, to reduce glare and the indoor temperature by about 10 degrees, and they keep out most bugs. There are 3 rolls of screens, for the front, port, and starboard windows. They are marked: S for Starboard, P for Port, and F for Front.

6. Heads:
   Each head has a breaker located in its respective vanity cupboard. The breaker is directly next to the bathroom’s AC socket. Be careful not to accidently bump the breaker when plugging and unplugging devices. This is easy to do. If the toilet seems to be not operating at all, check the breaker. When turned on, the bottom of the breaker should be pushed in.

   Although the heads operate separately, there is one fullness indicator for both. It’s located in the aft head vanity cupboard.

7. WA State Marine Parks Sticker:
   CoL has an annual sticker for moorage at WA State marine parks. It’s located on the portside transom. Note that the sticker covers moorage, but you must still register and pay for power, if used.
1B: General Description of this Vessel

1B1: Exterior

Flybridge, Cockpit, Side & Forward Decks

The Grand Banks 42' Classic is a traditional yacht design, with fiberglass hull, cabin, and flybridge structures, a teak swim step, teak decks, rails, and gunwhale caps, and stainless steel welded fittings and handrails. The window frames are of painted wood with sliding glass panes.

Of particular note are the easy walk-around decks, enabling safe, secure passage about the boat by passengers and crew. A roomy cockpit section with a storage lazarette beneath is useful for fishing and dinghy handling as it is launched. A swim shower outlet is provided in the cockpit.

On the side decks are the two fuel fills, one port-side and the other starboard. A holding tank pump-out deck fitting is to starboard. The water tank fills are in the lazarette on each of the three tanks. Fresh and salt water faucets are at the bow.

Forward on the bow deck is the anchor windlass, with foot switches, allowing chain movement both “up” and “down” electrically. The anchor is retracted into the bow pulpit which hangs out over the bow to give better chain clearance from the hull than otherwise possible. The pulpit is strong and braced, easily supporting not only the anchor during hauling but also an attending crew member if necessary. After passing over the winch, the chain goes below decks via a hawse pipe in the foredeck.

There are shore power connections (with an adjacent fuse holder) at both the bow and stern, selected by the shore power switch on the lower wall next to the electric panel; when this cable is to be disconnected, the switch should first be turned to the “off” position to avoid arcing which could damage the plug contacts. The boat’s 30-amp shore power cable is 50 feet long and stays with the boat when away from its home dock.

The barbecue is located on the aft cockpit, along with the gas cylinder that powers it. Two knobs must be turned to operate it. It is lit with one of the fire sticks from the top galley drawer.
The deck up three steps above the aft side decks is the “sun deck”. Here you will find the dinghy davit and dinghy.

Up three steps from the sun deck is the flybridge, with seating for crew and passengers, and the upper helm station. In addition to the helm’s instruments and controls, the console has storage for the ship’s canvas covers, and a space for flybridge electronics. Within the storage compartments beneath the flybridge you will find additional life jackets. The propane tanks for the ship’s galley stove are to port under the chart screen.
In addition to the two comfortable pilot’s seats just aft of the console, there is a comfortable L-settee with a teak cocktail table. In addition, two folding teak chairs are stowed behind the settee that can be set up and used for al fresco flybridge dining.

Storage is beneath the settee and under the console.

(More next page)
The boat is entered by either side door, port or starboard. These doors are fitted with strong-
deadbolt locks, and in addition have stainless catches affixed to the cabin sides to hold them open. The doors should be closed when underway except at very low speeds in calm waters to avoid getting salt water inside the doorways. The starboard and port door steps have storage beneath.

**Salon**

Just forward of the starboard door is a professional-quality helm station with electric switch panels adjacent and electronics panel above; on the helm itself are the ship’s Radar/GPS/Plotter, etc.

Just aft of the starboard door is the custom helm seat with three drawers and a cushioned top; the helm seat drawers have storage for manuals, tidetables, navigation tools, flashlights, etc. There is a cabinet door adjacent to the cabin starboard side door. Just aft of this is a dry bar with icemaker below. Aft of this cabinet is fitted an L-settee to starboard. Under this settee are miscellaneous items. A high-low table in front of the settee is used for dining/cocktails.

To port aft in the salon is the entertainment center housing the TV and stereo system. Forward of this is a settee.
The salon has as many amenities as you can imagine. As the old boater’s saying goes, this vessel easily “drinks” ten, “feeds” six or eight, and sleeps four in comfort!

(More next page)
**Galley**

The galley has a propane cooktop; microwave/convection oven; a large sink; two refrigerators and a freezer.

There is storage under and over the counters and in a cabinet at the top of the forward state-room steps. The stove burners have a push-button “igniter” to light them.
**Forward Stateroom**

The forward stateroom includes a large V-berth with an insert (stowed under the mattress), a hanging locker, and drawers/cabinets for crew clothing. A large overhead hatch in addition to side opening portlights, plus overhead and reading DC lighting provide for plenty of light.

The forward stateroom has a large V-berth with an insert that makes it into a very commodious accommodation.

The hanging locker in the forward stateroom is quite large and the space in it extends well to left of the large door. Contents are visible thru the smaller door left of the full-height opening.

Adjacent to the companionway to the galley and convenient to the cook, the upper cabinet provides additional galley storage. Note the fire extinguisher above the top-of-locker shelf.

**Forward Head/Shower Compartment**

Moving aft from the stateroom to starboard is the forward head compartment with its own shower and VacuFlush head and basin with vanity. A shower curtain which surrounds the wetted area keeps the rest of the compartment including the toilet dry when showering.

The forward shower provides for your guests' comfort when cruising.

The head compartment has lots of storage. Lighting is good from the porthole and nighttime illumination.
**Aft Stateroom**

The aft (master) stateroom is down a few steps from the port end of the salon. This stateroom features a queen-sized island berth, beneath which are drawers including a spacious and efficient chart drawer. To each side of the berth are tables with cabinets beneath, as well as storage lining the vessel’s exterior walls on each side.

A vanity/desk is aft to port beneath the emergency exit hatch.

To starboard of the berth are drawers. There is no longer a TV in the master stateroom.

Starboard forward is the shower compartment.

On the forward side of the M/S/R are hanging lockers and the companionway to the salon.

A peek into the port forward head & sink compartment. The holding tank indicator is in the small cabinet above the counter.

On the port side of the stateroom is a desk & storage. Above this is an emergency exit to cockpit.

**Master Stateroom Head & Shower Compartments**

Forward to port in this stateroom is a head compartment with toilet, sink/vanity, and numerous cabinets and drawers; to starboard opposite in the cabin is the stall shower. Between these two compartments are a huge hanging locker for clothing and the salon passageway.
1B3: Engine Room

Preferred access to the engine room is through the floor hatch by the lower helm centered in the saloon. Engine room lighting is turned on by breakers in the ship’s DC and AC power panels by the helm.

(There is also a door to the engine room under the forward companionway steps in the forward stateroom that is not used except for emergency access to the battery switches; it is somewhat blocked by a miscellaneous supplies storage box in the engine room.)

The engines are to each side. On the forward bulkhead are the DC battery main switches and paralleling relays, and the ship’s inverter.

On the starboard side from forward aft are a plastic spares storage box, engine control electronics box, house batteries in boxes, battery charger, head system pump and vacuum generator for the forward head, and engine muffler all outboard of the engine stringer. Aft of these is the fuel tank.

Aft of the starboard engine are the Racor fuel filters for it and the generator mounted on the side of the starboard fuel tank. The tank has a sight gauge (in addition to the electric gauge at the helm.)

Down the center of the engine room from the forward end are a tool bag, a removable bilge grid over the seawater valves and strainers, and aft, the generator seawater intake and valve, the oil change system, the Onan 9KW generator with its battery below, and the holding tank (under the generator.)

Looking down the starboard side, outboard of the engine.

Looking aft. The generator is top, with its battery, seawater fittings and the oil changer beneath it.

E/R Hatch. The ladder inside can fold out of the way.

To port forward: Inverter, refrigeration, compressor & control box, batteries, supplies. Engine room fire control system is on left edge of photo.

On the inboard side of the starboard fuel tank are the Racor filters for the starboard engine and genset.
To port in the engine room from the forward end are the refrigeration control box and compressor, electric valves for the hot water furnace, the water pump, accumulator tank, water heater, aft head vacuum accumulator/pump, and then the port tank with its sight gauge. In the inside side of this tank are mounted the port engine’s Racor Filters.

Of course, at the rear of each engine is its transmission.

The engine shafts lead from the transmission couplings through the hull via virtually maintenance-free shaft logs/packing glands.

1B4: Dinghy

The boat is equipped with a 11 foot-3 inch Novurania 335 DL tender which is a rigid-Hull, inflatable-pontoon boat and is fitted with a Yamaha 25 horsepower four-cycle electric start-and-tilt outboard motor and built-in fuel tank.

1B5: Deck Equipment

The boat has mooring lines; a stern/shore line 300’ long; an appropriate all-purpose anchor with 300’ of all-chain rode plus an emergency anchor with chain and rope rode; fenders/bumpers; four deck chairs; an ice chest; two crab pots with lines, floats, and bait riggings; a hose for fresh water tank filling and boat washing; and a boat hook.
1B6: SAFETY EQUIPMENT

Anchors
There is a permanently-rigged anchor on the bow pulpit and a spare anchor in the lazarette locker than can use the stern/shore line as a rode.

Carbon Monoxide Monitor
There are CO monitors in the staterooms and salon.

Fire Extinguishers
There are three handheld extinguishers in the forward and aft staterooms and the saloon. A fire suppression system is in the engine room with automatic thermal release and a manual control at the lower helm; this automatic system has automatic engine shutdown protection controlled at each helm.

First Aid Kit
It is in the port cabinet inside the master stateroom head.

Flares
In the cabinet just inside the starboard salon door.

Life Preservers/PFDs
There are two wearable vests in each stateroom’s hanging locker, and there are standard vests in two packs under the flybridge console.

A Lifesling rescue system is in a case on the flybridge starboard aft corner.
A heaving line and life ring are in a hanger on the aft railing of the flybridge.

Pumps
Manual diaphragm-type in the saloon starboard door step, plus three electric pumps.

VHF Radios
Built in at each helm station, one in bulkhead over lower helm, plus two handhelds.
Section 2: Important Vessel Numbers

Vessel Name: Change of Latitude
Vessel Official Number: 1162949
Hull ID Number: GNDD1549J405

Capacities:
- Sleeps four: Two in each stateroom
- Fuel: 600 Gallons in two 300 gallon tanks
- Fresh water: 265 Gallons in three tanks in lazarette
- Holding Tank: 40 Gallons

Dimensions:
- Length on deck: 43 feet 3 inches
- Length Waterline: 41 feet 1 inches
- Beam: 14 Feet 1 inches
- Draft: 4 Feet 2 inches
- Displacement: 39,000 Pounds

Fluids:
- Motor Fuel: #2 Diesel
- Motor Oil, mains: 15W-40 Chevron Delo Multigrade
- Transmission Oil: 30-weight Chevron Delo
- Engine Coolant: 50-50 mix, ethylene glycol & water; corrosion inhibitor added

Operating Parameters (estimated):

<table>
<thead>
<tr>
<th>RPM</th>
<th>Speed</th>
<th>Fuel Consumption</th>
<th>Naut. Miles/Gallon</th>
</tr>
</thead>
<tbody>
<tr>
<td>1600</td>
<td>8.5</td>
<td>6.0 GPH</td>
<td>1.41</td>
</tr>
<tr>
<td>1800</td>
<td>10.0</td>
<td>7.2 GPH</td>
<td>1.38</td>
</tr>
<tr>
<td>2000</td>
<td>11.5</td>
<td>10.8 GPH</td>
<td>1.06</td>
</tr>
<tr>
<td>2400</td>
<td>14.0</td>
<td>18.5 GPH</td>
<td>.76</td>
</tr>
</tbody>
</table>
(Intentionally left blank)
Section 3: Checklists & Maneuvering Suggestions

3A: Operating Checklists - Change of Latitude

First Thing Each Day
- Check engine oil, coolant.
- Check under-engine oil pads. Okay?
- Check fuel tank levels with sight tubes. Okay for the day’s run?
- Check holding tank indicator in aft head. Need pumping?
- Turn off anchor light if illuminated.

Starting Engines
- All lines clear of propellers and on deck.
- Items running on AC evaluated vis-a-vis the Inverter and Generator.
- Throttles retarded to idle, shift levers in “neutral”.
- Engine power switches and synchronizer breaker “On”, start engines in turn.
- If engines do not turn over, see “What to Do If”.

Leaving Dock (Only 3-4 minute engine warm-up required!)
- Shore power switch “Off”.
- Shore power cord removed, stowed on board.
- Step stool aboard, if used.
- Lines removed as appropriate.
- Fenders hauled aboard and stowed.
- Lines and other deck gear secure/stowed.
- Doors and hatches closed and secured as appropriate.

Underway
- Helmsperson on watch at all times.
- RPM under 1400 until engines warm to 140°; RPM never to exceed 2400 RPM.
- Synchronizer “On” as desired.
- Wake effects always in mind.

Approaching Dock
- Fenders out on appropriate side.
- Synchronizer “Off”.
- Radar off before entering harbor or anchorage.
- Bow line OUTSIDE stanchions and bloused around toward midships.
- Engines dead slow, wheel centered for engine-only maneuvering.
- Mate ready to secure stern first (in most circumstances).
- Trim Tabs Up (“Bow Up”).
Arriving at Dock in Marina

- Lines secure, including spring lines.
- Trim Tabs Up (“Bow Up”).
- Step stool out, if needed.
- Water heater breaker off until Inverter current settles (see “Inverters” below).
- Shore power cord connected and black safety ring hand tightened on boat connection.
- Dock breaker switch, when available, off until both shore and boat ends of power cord are connected.
- Shore power switch “On” to appropriate power location.
- Shore power confirmed on meters, Inverter “On”.
- Electric use monitored for current capacity of shore facilities.

Arriving at Mooring Buoy

- Trim Tabs Up (“Bow Up”).
- Skipper puts starboard end of swim step, with mate on it, next to buoy.
- Mate loops 20’ or so line, such as bow line, through buoy ring.
- Mate holds two ends together, walks up side of boat to bow of boat.
- With buoy held close to bow, line secured to each bow cleat through hawsepipe.

Mooring at Anchor

- Turn generator on to support heavy power requirement of windlass.
- Anchor is lowered from pulpit while boat is backed up slowly away from anchor.
- When desired chain length out (4:1 or 5:1 scope), windlass is stopped.
- Engines reversed for “count of five” until chain pulls up virtually straight. Note: The boat is not held in reverse against a taught anchor chain!

Generator Starting/Stopping

- Be sure “generator” breaker is “Off” when starting to allow warm up without load.
- Hold switch in “Start” position until it starts (this takes approximately 5-10 seconds!)
- Check port side exhaust for water flow.
- After one minute for warmup, turn power selector from “Off” to “Gen”.
- Stopping: Turn power selector from “Gen” to “Off”, wait one minute for cool-down.
- Hold “Stop” switch until stopped.

Overnight Checklist in Marina

- Shore power “On”.
- Inverter “On”.

Overnight at Anchor or Buoy

- Anchor light “On”.
- DC electrical items all “Off” including radios, extra lights, etc.
- Run generator until double green lights show in the inverter panel but not past 9 pm.
- Conserve AC and DC electrical use as much as possible overnight.

Upon Arising

- If at anchor or buoy, Inverter “On”.
- Start generator if necessary for battery charging.
- Turn on heat if necessary.
- Go to top of this Change of Latitude checklist.
3B: Maneuvering Suggestions

3B1: Docking & Undocking

Usually it’s easier to dock bow in. Have your mate at the side rail opening, ready to step off and secure the stern line, against which you can pull to swing the bow in toward the dock. By having your mate ready to disembark when close to the dock, he/she will not have to jump to the dock, risking a turned ankle or falling overboard. It is the skipper’s job to put the boat next to the dock so the mate needn’t jump, but merely step off!

Approaching a dock, have fenders out as required and have the bow line already rigged, passed through its hawse pipe, and draped back on the side of the boat between the stanchions so it can be reached from the dock. Never put a line from a cleat over a rail: the boat’s weight will bend or break the rail if it pulls against the line! When the mate’s ashore, the line can be easily reached!

If dock clearance permits, spring the boat forward so that it pulls forward on the stern line. This will bring the stern close to the dock. Let the bow line out enough so that the boat can rest against the stern and midships fenders.

3B2: Maneuvering in a Harbor

With its twin screws, you’ll do best if you center the rudder and steer with the engines only at idle speed! The props are so large that the boat will respond well except in high winds just with use of the propellers in forward and/or reverse. Take your time, and keep the boat running “dead slow” so that you can plan each approach. You shouldn’t need to use the throttles at all. Make sure the radar is off so you do not radiate others in the marina.

Filling the Fuel Tanks

With the large fuel tanks, you can fuel the boat pretty fast using a standard hose and nozzle (like those on auto gas pumps). Fuel each tank, taking the hose around the fore-or-aft deck to reach the outside fill pipe (don’t drag the hose over the decks or teak rails: have someone help you handle it). Fill both the tanks completely but do not spill fuel! You can control the flow rate by sound, as the fill pipes make the characteristic “getting to the top of the bottle” pitch change when the fill pipes begin to fill when the tanks themselves are full. (The tank vents will gurgle before the tanks are full, so when the vents begin gurgling, slow down until you hear the fill pipes’ pitch change.)

You can tell fuel levels in two ways: By the sight gauges in the engine room on each tank (accurate); and by the gauges on the electronics panel above the galley cabinets and windshield to left of the lower helm.
3B3: Anchoring

Anchoring can be accomplished safely with a minimum of fuss if you are prepared. Or, if you are not ready, it can be stressful and dangerous for you or the boat.

Before attempting to anchor, select an anchorage with a soft bottom such as sand, mud, or gravel, if possible. Look at the charts and cruising guides for tips on good locations. Then, choose the spot in the anchorage where you have room to “swing” on the anchor without disturbing other boats. Remember, responsibility for leaving room goes to each successive boat to arrive, for the first boat has priority in the anchorage!

Here in the Northwest, because of the deep waters, all-chain rodes and small bays, we anchor a little differently than in the Gulf of Mexico or Caribbean, for example. First, except in severe weather we use anchor chain scopes of only 4-to-1 or 5-to-1. For example, in water that is 40 feet at low tide in the typical anchorage, we might use 160 feet of chain unless the weather was to be gale force or greater winds.

Second, because of the small bays and steep bottoms, we often rig a shore line from the stern of the boat to shore. The best example of this would be at Todd Inlet at Butchart Gardens: Here is a bay that can accommodate 8 - 10 boats, yet it is only about 150’ wide and 200’ long! Boats attach their bows to the mooring buoys or, in a few cases, anchor; and then their sterns are secured to rings provided in the steep cliffs overlooking the bay. Boats are thus perhaps only 15-20’ apart, side to side.

Third, boats often will “raft” side by side in busy marinas, although this is not very common.

Fourth, courteous boaters will call vessels coming into busy bays and offer to let them raft to the same buoy, if signs on the buoys do not limit usage to only one boat depending upon length.

Anchoring safely requires two persons, one at the helm maneuvering the boat and one on the bow operating the anchor. Putting the bow of the boat over the spot where the anchor is to be placed after checking the depth on the depth sounder, the windlass foot-switches, or the anchor switches at the upper or lower helm, are used to lower the anchor slowly toward (but not onto) the bottom, by watching the chain markings.

The chain is measured by marks on the chain as follows:

<table>
<thead>
<tr>
<th>10’</th>
<th>Red Yellow Red</th>
<th>200’</th>
<th>Red</th>
</tr>
</thead>
<tbody>
<tr>
<td>50’</td>
<td>Yellow</td>
<td>250’</td>
<td>Yellow</td>
</tr>
<tr>
<td>100’</td>
<td>Red</td>
<td>290’</td>
<td>Red Yellow Red</td>
</tr>
<tr>
<td>150’</td>
<td>Yellow</td>
<td>300’</td>
<td>Total anchor chain length</td>
</tr>
</tbody>
</table>

When the anchor is about to reach bottom, the boat is backed away by putting the engines into reverse for 5 seconds: eddies from the chain indicate motion. Resume lowering the anchor while drifting backwards (watch the eddies and add another burst or reverse if necessary!) until the desired amount of chain is out. Stop paying out chain. Engage reverse for five seconds at a time until the chain starts to pull straight off the bow toward the anchor. A straight chain indicates a “set” anchor!

NEVER pull on the chain for more than five seconds, and never at any engine RPM other than idle! Putting the boat’s weight plus its horsepower on the chain forcefully even at idle will bend the anchor and/or damage the mooring gear!

If while checking the set, the chain rumbles and clunks, and seems to release in bursts, it means you’re anchoring on a rocky bottom and the anchor is not holding. Be patient: it may not set on the first try, and you’ll have to repeat the process sometimes to get a good “set”.

Section 3B: Maneuvering Suggestions 3.4
3B4: Shore Lines

When a shore line is required, anchors are set 75 - 100 feet from shore, with the boat backing toward shore during anchor-setting. The stern line is put around a tree, and brought back to the boat. During this process, be sure to keep clear of rocks near the shore, and allow for our Northwest tides, occasionally twelve feet, and sometimes 20 feet when further north! Check the present tide, and high and low tides before beginning anchoring: No sense anchoring in 15 feet of water if you’re at the “top” of a 15 foot tide!

To get to the shore, you will need to have a dinghy down, and then have your mate keep the boat’s stern toward shore with short bursts of reverse gear. Sometimes a helpful boater already anchored will help you by taking your line to shore for you with his dinghy, a neat “good deed” that you might reciprocate. We’ve met some nice boaters this way!

The shore line is in the lazarette, and is long enough to usually allow taking it to a tree, around it, and back to the boat so you don’t have to go ashore to untie when leaving. With a crew member keeping the boat in position, take the dinghy to shore pulling the end of the shore line with you. Pass it around a tree, and pull it back to the boat if you can, since then to get away in the morning all you have to do is release the bitter end from the boat, and pull it aboard. Pull the line tight, as long as you’ve got over 100’ total of line out: there is plenty of sag/stretch, and we want to keep the boat in its area! If necessary, put a crab pot float or fender on the line to warn others it’s there!

Here is a sketch of a properly anchored boat with a shore line (In this drawing, S=Scope, which should be at least 4 x DH, the Depth at High Tide):
3B5: Trim Tabs

The boat is fitted with a set of Bennett Trim Tabs. These are wide “flaps” attached to the aft end of the boat, under the swim step at the trailing edge of the hull, operated hydraulically under the control of the skipper by rocker switches with indicators at each helm station.

At low speeds, up to approximately six knots, the tabs do little, and should be left in the “Bow Up” position (see below). But at speeds over this range, the tabs begin to take effect and will help the operator lower the bow for more efficient cruising.

The best way to adjust the tabs is to lower them while watching the “Speed” indicator to get the highest speed at a given throttle setting by adjusting “Bow Down”. If the tabs are “Bow Down” too much, the steering will get mushy and speed may drop off a little, and the tabs should be adjusted “Bow Up” a little. Note that it will take time to make these adjustments; when the buttons are depressed, they need to be held 2-5 seconds each time for change to be felt and observed (the best way to see the effect of the tabs is by the knot meter and by observing the height of the bow relative to the horizon, most easily seen from the lower helm station).

Because the trim tabs are so large, THEY MUST BE IN THE FULLY-BOW-UP POSITION WHENEVER THE BOAT IS TO BE OPERATED IN REVERSE, otherwise the great water forces against the tabs may damage them severely, even tearing them off the hull!
Section 4: Specific Boat Systems & Operations

This section of the operating manual will discuss each of the boat’s systems. The systems and major components discussed are in alphabetical order as follows:

4A: Anchor & Ground Tackle
4B: Barbeque
4C: Bilge Blowers
4D: Bilge Pumps
4E: Dinghy, Davit & Outboard
4F: Electrical Systems, AC
4G: Electrical System, DC
4H: Electronics
4J: Engines & Transmissions
4K: Fresh, Salt, & Waste Water Systems
4L: Fuel System
4M: Furnace
4N: Galley & Appliances
4P: Head Systems
4Q: Running Gear (Props, Shafts, Thruster)
4R: Safety Equipment
4S: Sea Strainers & Thru Hulls
4T: Warning Lights, Alarms & Wipers

4A: Anchor & Ground Tackle

4A1: Anchor Bridle

There is an anchor bridle stowed forward on the boat in the starboard deck storage box. Use it when anchoring overnight, as it accomplishes three goals:

- It takes the strain of the anchor off the windlass, pulpit, and pulpit pulley and directs it to the bow cleats which are more suited to hold it;
- It reduces substantially the “chain noise” transmitted to the occupants of the forward cabin;
- It allows the anchor rode to have a lower angle relative to the sea bottom, thus increasing the anchor’s holding power.

To use the bridle:

1. Lower the anchor normally (see page 4.2) then, after it is set,
2. Hook the bridle on the chain just in front of the anchor pulpit bow roller;
3. Then secure the bridle rope ends through the side-coaming hawse pipes, to the bow cleat on each side so the bridle lines are equal in length and as long as possible;
4. Last, operate the windlass to pay out anchor chain so the chain slacks and is supported by the bridle, the chain forming a loop right in front of the boat’s bow.

If you wish, you can pay out additional chain to form a long hanging loop between the boat and bridle, which weights the chain down in front of the boat well below its normal path; thus the chain itself becomes a “kellet” or “sentinel”, lowering the chain angle more than the bridle alone. The weight “drooping” the chain down like this then forms a an even more effective “snubber”, so the boat is gently held against the pressures if wind and tide increase.
4A2: Anchor Chain Locker & Anchor Jams

**Anchor Handling:**

The anchor, forward on the bow pulpit, is raised and lowered by the electric windlass. The chain goes from the windlass into the chain locker through the chain pipe behind the chain wheel ("wildcat"). From here, it goes into the bow locker.

*Be careful when dealing with the chain! If a crew member is operating the windlass be especially careful to keep fingers, hands, arms, etc. away from the chain!*

*Do not raise or lower the anchor without either the engines and genset running.*

*Use the foredeck footswitches, not the helm switch, so you can see where the chain is going and be sure it is clear of the boat properly when raising or lowering the anchor!*

**Lowering anchor:**

If the chain jams while lowering anchor, it is because one loop of the chain on top of the pile has fallen inside another loop of chain when the chain pile may have fallen over or shifted. *There is no way the chain can be tangled so that you will ever need to disconnect it!* One easy way to disentangle the chain is, while wearing gloves, grasp the chain on the forward side of the windlass, and, while lifting it above the wildcat manually, rapidly yank it up and down. This will usually free it.

If, on the other hand, this “yanking” technique fails, look into the chain locker to un-overlap the layers of chain in the pile.

**Hauling anchor:**

*Be careful when dealing with the chain! If a crew member is operating the windlass while a person is accessing the chain locker, be especially careful to keep that person’s fingers, hands, arms, etc. away from the chain! Use a windlass handle or broomstick to deal with the chain.*

4A3: Anchor Chain Measurement

The anchor chain is measured by marks on the chain as follows:

- 10’ Red Yellow Red
- 200’ Red
- 50’ Yellow
- 250’ Yellow
- 100’ Red
- 290’ Red Yellow Red
- 150’ Yellow
- 300’ Total anchor chain length

4A4: Anchoring & Stern/Shore Line: See Section 3B.
4A5: Anchor Windlass

The anchor on Change of Latitude is raised and lowered by a Lofrans Tigres Windlass on the bow pulpit. The windlass is controlled by foot switches at the bow. The control circuit breaker for the windlass is on the windlass breaker panel on the starboard side of the salon helm console. The windlass raises/lowers the anchor.

Be sure to leave the breaker “Off” when the windlass is not in use. This prevents damage in the event that a foot switch fails due to salt water contamination!

If the windlass should fail to operate when its foot switches are operated, trouble-shoot as follows:

- Be sure the windlass breaker and switch are “on”;
- If the breaker/switch was on, try the manual up/down switch at either helm (if this works, use these switches instead of the foot switches until the foot switches are repaired);

**THINGS TO KNOW ABOUT CHANGE OF LATITUDE**

- If the manual switches don’t work, you can quickly determine if the windlass itself has failed: Remove the back cover from the windlass and, with a voltmeter, check to see if while a switch is depressed, there is DC voltage on it’s terminals; if not, check the actual wires themselves where they connect to the windlass. The windlass uses so much current that sometime the connection — though it appears tight — may have failed. If there is voltage on the wires, turn off switch and tighten the nuts firmly on the terminals.
- If all this fails, use the manual cog (green arrow) to engage the teeth on the windlass to keep the wildcat from letting out chain while you loosen the clutch (red arrow) on the starboard side of the windlass, then put the handle in the collar on the left side (yellow arrow), and “ratchet” the windlass up with the handle, tightening the place after each lift to keep the chain from slipping back.
4B: Barbeque

Change of Latitude carries a propane barbecue which is located atop the transom in the cockpit.

To operate the barbecue:
1. Be sure the propane tank valve is on;
2. Turn the valve to the right of the grill to “High”
3. Use a fire stick, located in the top drawer under the sink, in the galley, to light the grill.
4. Windy days may affect the performance of the grill.

4C: Bilge Blowers

The boat has bilge blowers controlled by a switch in the DC breaker panel at the lower helm. These blowers are not generally needed in the cooler climates of the Northwest; they would be used in hot weather such as in southern latitudes, or to moderately cool the engine room when an operator has to be in it when the engines are, or have been recently running.

4D: Bilge Pumps

The boat has three bilge pumps, one in each bilge area, each controlled by a “mode” switch in the “12 Volt DC” panel by the lower helm. The pumps have “pop out” circuit breakers in the engine room on the forward bulkhead above the switches.

Each switch in the breaker is labeled “Auto”, or “Manual”, and these switches should be left in the “Auto” position.

When in “Auto”, the pump is controlled by its float switch.

When set to “Off” — the unlabeled center position — the pump will not run (this position is used in case the float switch will not turn off when all the water has been pumped due to a defective float switch.)

When set to “Manual”, the pump is running without regard to the float switch. This is used by the operator to check the bilges, to drain water below the range of the float switch, and to bypass the switch in case it is defective.
4E: Dinghy, Davit & Outboard

4E1: Davit

This boat has a high-quality electric davit supporting the dinghy. To use it,

1. Release all dinghy tie-downs and trickle charge cord. Raise the engine so that it clears the stantions. The dinghy drain plug should always be in place on CoL since there is an automatic bilge pump. Please do not remove the plug. However, it is also a good idea to make sure the plug is in place before lowering the dinghy.

2. The remote control for the davit is in the foot box by the starboard door. Insert the davit remote control's plug in the receptacle to the port side of the aft starboard window.

3. Being sure the sling chain is properly clear of the dinghy seat and through the upper portion of the stainless grab bar. See photo on the next page to see how it fits through the grab bar. Attach the hoist cable to the snap-hook on the dinghy’s sling chain.

4. Hoist the dingy carefully by operating the remote control until it reaches several inches before its vertical limit on the davit.

5. Rotate the dinghy so that the bow faces the stern of the main boat.

6. Manually swing the dinghy to the starboard side of the boat while steadying it so that it is parallel to the boat’s hull.

7. Then pay out cable from the davit, with a crew member “walking” the dinghy to the aft swim step for boarding when it reaches the water’s surface and floats.

8. The crew member then releases the dingy sling hooks from the dinghy and keeps tension on the cable while securing the sling to a point on the vessel as the davit control is operated to take in the excess cable so that it is lightly tensioned until the dinghy is returned to the boat.
4E2: Dinghy

The dinghy aboard this boat is a 11’2” Novurania 335 DL hard-bottom inflatable boat.

For safety, and compliance with U.S. rules, there should be a life jacket aboard the dinghy for each passenger aboard whenever the dinghy is at sea.

The dinghy is equipped with running lights, fuel tank and gauge, depth sounder, speed log, cigarette lighter/DC outlet, and bilge pump. Be sure all equipment is “Off” when stowing the dinghy! The dinghy has an automatic bilge pump, so the drain plug should be in at all times.

Please be careful when pulling the dinghy ashore on beaches to minimize damage and scratches to the bottom. Don’t "Ram" the beach; you can bump up to the beach gently and step ashore over the bow, pulling the dinghy a little more ashore as each person off-loads. Don’t forget to raise the outboard!

The dinghy has a built-in trickle battery charger. If the battery is low, connect the AC cable (stowed in the aft seat of the flybridge L-settee) to the receptacle in the dinghy seat front to the outlet just under the flybridge overhang to port of the aft saloon window by the flybridge steps. The cable may also stay connected while the dinghy is onboard. Just remember to disconnect before lowering the dinghy.

4E3: Outboard Motor

The outboard motor for the dinghy is a four-stroke Yamaha 25 hp outboard. It uses plain fuel, oil should not be mixed with the gasoline. To check the oil, remove the cover by operating the latch at the back of the motor. The dipstick (yellow) is on the starboard side, while the fill is aft. Use the 5-30 Yamaha oil stowed in the lazarette.

Be sure to replace and latch the cover after the checks!

The motor has an automatic choke.
**Outboard Operation:**

1. Be sure engine is lowered. The red rocker switch on the end of the control handle operates the motor’s electric tilt.
2. Pump fuel line bulb until it resists your squeeze.
3. Turn key to center “On” and “Right” to start. The choke is automatic.
4. Lift the lever that overhangs the aft edge of the control module to accelerate the engine for warm-up.
5. From neutral, squeeze, then push control handle forward or back to engage gears and advance throttle in either direction.

(More next page)
Section 4F: Electrical Systems, AC

The AC electrical system is controlled at the AC electrical panel.

Note: The panel photographs are taken at an angle to reduce glare from the light reflections on their high-gloss finishes.

4F1: AC Generator

The ship’s Onan Generator provides 9,000 watts of AC power to the vessel and is used for battery charging, heating hot water, and operation of incidental AC appliances.

The generator is in the engine room. Service access is by unlatching and removing the forward panel on the generator’s sound-shield cabinet. More important is checking the sea strainer (see 4.44) to be sure it has not accumulated substantial debris while the generator was run for extended periods, particularly at anchor.

Starting the Generator:

1. Move the switch in the AC power panel to “Start” switch and hold until the engine starts. This will take approximately 30 seconds (there is no separate “glow-plug” switch!) Only when it is started and running should you release the switch.
2. Check the generator exhaust, or listen for it to confirm that cooling water is being pumped from it.
3. After a brief warmup of a minute or so, switch the shore power switch in the AC power panel to “Gen”. You should see the AC meters indicate there is voltage.

Stopping the Generator:

1. Switch the Shore Power switch to “Off”. This removes the load for the generator and allows it to cool down.
2. After at least a minute to allow the generator to cool down, press and hold the switch in the AC power panel toward “Stop” until the generator comes to a complete stop.

Note: Generator battery charges with the generator when it is running. Alternately, you can charge the battery through the back-up charger on the “battery charger” breaker.
**Routine Generator Service:**

The generator oil is easily checked. Remove the forward cover on the generator by turning the two knobs on its upper corners and lift it out of the way. The dipstick and fill cap are easily visible.

It shouldn’t be necessary to add coolant, but if you do need to, use 50-50 antifreeze mix adding it to the coolant tank on the port side of the generator (you can access the heat exchanger itself under the generator sound shield through the access port on the top of the shield.)

**Generator Problems:**

The generator monitors its own operation, detecting any loss in oil pressure or any overheating. If either occurs, the generator shuts itself off, and will not keep running when you try to restart it.

**Before repeated starting, shut off sea water supply to avoid water-locking the engine!**

Then, remember to turn it back on when the generator starts!
4F2: AC Inverter System

The Inverter Makes AC from DC...

As we said, the Inverter system is used to provide AC to the boat when there is no shore power. It is wonderful, for example, to use the inverter to make a pot of coffee when the engine is running and you are underway, or to watch TV in a quiet anchorage, or use a hair dryer for a few minutes in the morning. But for long-period use of AC by large appliances, the engine or generator must be running or you must have shore power available.

Now the microwave, for example, will draw about 100 amps of DC when using the inverter to run it, so in six minutes you use one-tenth of an hour at 100 amps, or ten ampere-hours. That’s okay. But what if you want to cook a roast for 30 minutes? You would use up a lot of energy on that one job alone! That’s too much use for the inverter, and the propane stove or convection oven should be used.

For a short task, the inverter is great: no starting the generator, no noise, no fuss, the power is there. If the engines are running, use it all you wish, as long as you don’t try to do two huge jobs at once: The inverter produces a maximum of 2,500 watts of energy at a time. So the inverter is only wired to the outlets, icemaker and the engine room lights. It will not run the water heater, battery charger or refrigeration.

Note: Only the breakers in the panel illustration on page 4.12 with an asterisk (*) are powered by the inverter!

...and also is a Battery Charger, Making DC from AC!

The Inverter can also do the reverse: If there is AC power available from a shore-side source or the generator, it can recharge the house batteries. The battery charger function receives that power through the “Inverter Battery Charger” breaker on the AC panel. Since this breaker must be “On” for the batteries to charge using AC power, and you will want to charge the batteries at every opportunity, we suggest that you leave it “On” for the duration of your cruise.

As noted above under the “Connecting Shore Power” section, be mindful that the Inverter can draw a lot of current when charging the batteries, especially when first activated upon connection to shore power. Thus, you need to be careful not to overload a shore power circuit by running other high-draw AC appliances at the same time. Monitor the AC Ammeter to make sure the load remains below the available current as determined by the shore power service from the marina, normally 30 amps.

Inverter Operation

The Inverter is controlled by its control panel located above the lower helm station. The panel has an LCD display that shows the present function. LED Display lights tell you the inverter’s status.

The inverter should be “ON” all the time. You will see one of the “AC IN” lights lit (depending if shore power or the generator is running) or the “Inverting” light, indicating that the inverter is making AC from the ship’s batteries.

If one of the “AC IN” lights is lit, you should see the “Bulk” or “Float” light lit, indicating that the inverter is charging the batteries as it should.
In summary, the inverter should be on whenever shore power is present or the generator is running, and it should also be left on when underway.

Full instructions for the inverter control panel are in its manual.

The inverter is set up by the charter company before your departure and should not require any adjustment during your trip!

Note again: Only the breakers in the panel illustration on page 4.12 with an asterisk (*) are powered by the inverter!

Occasionally the words on the inverter panel above the lower helm may turn to gibberish. Briefly push the “reset to factory defaults” button to clear with the point of a pencil or a paper clip. This button is on the lower left corner.
**4F3: AC Panel 120-volt Breakers**

This section of the AC panel provides standard 120-volt power throughout the vessel. Below are described each breaker’s circuits and its use.

Key:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>“B”</td>
<td>“Breaker”</td>
</tr>
<tr>
<td>“S”</td>
<td>“Switch and Breaker”</td>
</tr>
<tr>
<td>“WL”</td>
<td>“Warning Light”</td>
</tr>
<tr>
<td>“MS”</td>
<td>“Momentary Switch”</td>
</tr>
<tr>
<td>Green</td>
<td>Leave this Breaker on Always</td>
</tr>
<tr>
<td>Yellow</td>
<td>Use when Item is Needed</td>
</tr>
<tr>
<td>Red</td>
<td>Use with Caution in Exceptional Circumstances</td>
</tr>
<tr>
<td>*</td>
<td>Runs on Inverter</td>
</tr>
</tbody>
</table>

### Table: AC Panel 120-volt Breakers

<table>
<thead>
<tr>
<th>BREAKER</th>
<th>USE</th>
<th>USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC Main</td>
<td>S MAIN SWITCH</td>
<td>AC Outlets*</td>
</tr>
<tr>
<td>Reverse Polarity</td>
<td>WL Polarity Reversed!</td>
<td>Ice Maker*</td>
</tr>
<tr>
<td>Reverse Polarity Test</td>
<td>MS Press to test PR bulb</td>
<td>Engine Room Lts*</td>
</tr>
<tr>
<td>Microwave*</td>
<td>B To microwave outlet</td>
<td>Inverter</td>
</tr>
<tr>
<td>Comfort-Hot</td>
<td>S AC heat assist</td>
<td>Spare</td>
</tr>
<tr>
<td>Comfort-Hot</td>
<td>S AC heat assist</td>
<td>Fridge</td>
</tr>
<tr>
<td>Genset Start-Stop</td>
<td>MS Left to start, right to stop</td>
<td>Genset Start-Stop</td>
</tr>
<tr>
<td>Genset</td>
<td>B Genset control circuits*</td>
<td>Water Heater</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Battery Charger</td>
</tr>
</tbody>
</table>

- Runs on Inverter
- Use with Caution in Exceptional Circumstances
- Use when Item is Needed
- Leave this Breaker on Always
- POLARITY REVERSED!
4F4: AC Panel, Metering Section

The top portion of the panel is devoted to two meters which show the voltage available and the current in amperes (amps) being used by the boat. Duplicate meters are in the overhead bulkhead next to the inverter for ease of viewing. When connected to shore power or with the generator running, you should have between 110 and 130 volts, 105 volts minimum. When connected to 30-amp shore power you should not turn on too many breakers, lest the load exceed 30 amps; with the generator, do not exceed 90 amps.

4F5: AC Reverse Polarity

Although we tend to think of AC Electricity as having only two conductors, it actually has three. One of these is called “neutral”; one is “hot”; and one is “ground”, that is, it is supposed to be the same as the water around the boat and the earth ashore.

The vessel and many of its appliances rely upon these connections having the correct “polarity”, or relationship to one another and the earth; this is essential to be sure that users of AC equipment do not get a shock when touching any AC equipment.

Now in a house ashore, it’s easy: We don’t “plug in” the house, for it stays connected to the utility company all the time! But in a boat when in the harbor, we do plug in using our Shore Power cords (and sometimes using extension cords). If the outlet to which we plug our cord, or if the cord itself is mis-wired, then these connections can become mixed up, and then there is a significant chance of getting a shock or just as bad, a chance that running gear outside the boat will be subject to rapid corrosion, because the boat is immersed in sea water, a good conductor of electricity.

To protect the vessel and its crew from such contingencies, a “Reverse Polarity Warning” light will illuminate when the connection turned on.

If the “Reverse Polarity” light should illuminate when connecting to Shore Power, immediately disconnect the cable and contact the harbor master advising him/her of the problem. Do not risk shock or system damage!

4F6: AC Shore Power, Disconnecting & Connecting

The large AC selector switch to the right of the power panels is used to determine the source of AC power for the boat.

The switch has four positions, “Off”, “Gen”, “Fwd Shore”, and “Aft Shore”. The “Shore” positions represent the bow and stern shore power connectors for the shore cable.

This switch should be left “OFF” whenever you are connecting or disconnecting the boat to shore. This is true so that you do not draw an arc from the plug due to the load of the boat on the connector’s pins: such an arc will burn the contacts and eventually cause them to overheat when in use, creating a fire hazard.

Once connected to shore power, monitor the AC voltmeter and ammeter to be sure you have not overloaded the circuit.

Important Note: If the house/inverter batteries are low when you first hook up to shore power, and the inverter is turned on (as it should be), the inverter will begin charging its batteries at a very high charging rate, drawing a lot of shore power current. Until this demand reduces (see “The Inverter System” below), you should turn “OFF” other high-current AC appliances such as the water heater.
You can then turn on AC appliances as needed. Watch the ammeter to be sure you don’t exceed the dock’s available supply, typically 30 amps.

Here are some estimates of AC power consumption for typical appliances:

<table>
<thead>
<tr>
<th>Appliance</th>
<th>AMPs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water heater</td>
<td>15</td>
</tr>
<tr>
<td>Hair dryer</td>
<td>12</td>
</tr>
<tr>
<td>Coffee maker</td>
<td>10</td>
</tr>
<tr>
<td>Toaster</td>
<td>12</td>
</tr>
<tr>
<td>Inverter</td>
<td>up to 22</td>
</tr>
<tr>
<td>TV</td>
<td>2</td>
</tr>
<tr>
<td>Microwave</td>
<td>12</td>
</tr>
<tr>
<td>Comfort hot</td>
<td>36 (18 amps each breaker)*</td>
</tr>
</tbody>
</table>

*Comfort hot should only be used by NW Explorations during winter “storage” at dock.

(Continued on next page)
4G: Electrical Systems, DC

4G1: DC Concepts

Each year it seems more folks are confused by the operation of electrical systems on yachts than by any other subject! Don’t feel discouraged if something isn’t clear: you’ve got company in your confusion. So let’s try to cover some theory here first.

Most of the equipment on any boat is run by 12-volt DC electricity from the boat’s batteries. This is true because DC should always be available: we have batteries aboard even when there is no shore power! If the batteries aren’t run down, everything should work, just like in the family car.

Since the batteries are used so much, we have to replenish, or charge them. The most important way we do this is by alternators on the ship’s engine. In most cases one engine will provide enough electricity in most every case to run everything, and still have some energy left over to add back to the battery, that is, to charge it.

Ah, but what if the engine isn’t running? Then, the batteries are slowly depleted until they have “run down” and there is no more electricity stored in them . . . a big problem, because then we not only can’t run all the neat stuff on the boat, we can’t start an engine to get more electricity.

So a good skipper and crew has “electrical power management” in mind whenever they turn an electrical gadget on or off!

It is with this concern that we can cite a reality: If we need more electricity than the batteries alone must provide, and if the propulsion engine isn’t running, we will need to get our electrical power from an alternative source! That’s the most important reason why we plug the boat in to shore power or use the generator: To keep from running down the batteries. For by using battery chargers getting their power from shore power or the generator, we can keep the batteries charged, or, at least, from getting too low.

In modern, luxury cruising boats, however, there is another important factor: Some of the “goodies” we like to have on board such as hair dryers and microwave ovens require ordinary household electricity. This is 120 volts AC. It is different from DC. So if we want to use these things when we’re not at a dock, we must have another way to get 110 volts AC, and for this we use the generator or an inverter, an amazing high tech gadget that takes 12 volts DC from the ship’s batteries and makes it into 110 volts AC!

So here’s what we’ve got:

- A lot of stuff running on 12 volts DC with that electricity from the batteries;
- To keep the batteries from running down, we have alternators run by the engine, and battery chargers that get their power from shore power or the generator;
- For the stuff that runs on 120 volts AC, we have shore power, the generator, or, for making AC out of the batteries’ DC, the inverter.
4G2: DC Batteries

The batteries on this boat are not just one, big all-purpose battery. To have redundancy, there are actually several “banks” of batteries totaling 18 batteries (!) assigned different tasks. They are monitored through the DC Voltmeter to the right of the helm.

A starting battery (12 volts; #1) is located along the starboard side of the engine room and is used for starting the main engines only; that way, it won’t run down playing the stereo, for instance, and then be unable to start and engine. The battery is charged automatically through an ACR (Automatic Charge Relay). This relay automatically charges the start battery through shore power or the generator via the inverter, or the alternators when the engines are running. You can also charge the start battery with the backup battery charger if necessary.

A “house bank” (#2) consist of four 12-volt AGM batteries, paralleled to give a reserve power. These are in the forward engine room and starboard side of the engine room. Connected to these are all the pumps, lights, horns, navigation and radio gear, etc., the boat’s “house”. They are charged through the inverter when plugged into shore power or using the generator. They are charged through the alternators when the main engines are running. You can also charge the house bank with the backup battery charger if necessary.

The generator battery (#3) is located under the generator. It charges itself when the generator is running. Alternately, you can charge the battery through the backup charger on the “battery charger” breaker when on shore power.

Another pair of two batteries in parallel is forward under the guest stateroom berth to operate the bow thruster. See the “Thruster” section on page 4.40.

This parallel switch should be left in the #1, “parallel with house” position!

Another 12-volt battery (#3, in the engine room under the genset) provides 12 volts for starting the generator.

If the engine starting battery is low, you can provide voltage for starting by either:
1. Pressing the “Batt Parl” rocker switch by the horn button on the helm.
2. Start the generator and make sure the inverter is charging.
3. Alternately, you can charge the battery with the backup battery charger.

4G3: DC Battery Chargers

The vessel is equipped with a 12-volt battery charger. It charges all the batteries, although normally this charger is off and the inverter is left “On”.

The charger is switched on by its breaker in the 120-volt circuit breaker panel.

Note: The Inverter is primarily used for all battery charging.
**4G4: DC Battery Switches**

The boat is equipped with two (2) small panels of battery switches mounted in the engine room on the forward bulkhead.

Battery switches for every battery bank except the thruster are on the lower panel, and an inverter battery paralleling switch and inverter main battery switch are on the upper panel.

Easily accessed from the engine room, these switches are also reachable through the door under the companionway steps in the forward stateroom in an emergency.

Here is the purpose of each switch:

<table>
<thead>
<tr>
<th>SWITCH</th>
<th>PURPOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lower Panel Switches</strong></td>
<td></td>
</tr>
<tr>
<td>Genset</td>
<td>Turns generator battery on/off</td>
</tr>
<tr>
<td>House</td>
<td>Turns house battery bank on/off</td>
</tr>
<tr>
<td>Dinghy Lift</td>
<td>Controls supply to dinghy davit</td>
</tr>
<tr>
<td>Port Start</td>
<td>Controls supply to port engine from starting battery</td>
</tr>
<tr>
<td>Starboard Start</td>
<td>Controls supply to starboard engine from starting battery</td>
</tr>
<tr>
<td><strong>Upper Panel Switches</strong></td>
<td></td>
</tr>
<tr>
<td>Left: Inverter Battery Parallel</td>
<td>1 = With house (normal) 2 = With starting (emerg. only)</td>
</tr>
<tr>
<td>Right: Inverter Battery</td>
<td>Turns inverter battery on/off</td>
</tr>
</tbody>
</table>

Also on the lower panel are pop-out breakers for the bilge pumps, stereo, battery condition meter circuits, CO detectors, and the battery parallel relay coil circuit. The button on the breaker will pop out if the circuit is overloaded, a condition that will require service by a qualified marine electrician.
There are two panels on the boat that control the DC power distribution to the boat's various DC equipment. One of these which we call the Helm DC/Engine Power Panel (photo on right) is limited to:

1. supplying power to the engine control circuits;
2. supplying power to the synchronizer and engine room blowers;
3. operating the horn
4. allowing for paralleling the batteries in event of a low engine battery.

The other panel is the 12-volt main breaker panel to the right of the helm which is described on page 4.19

**Helm DC/Engine Power Panel**

This panel is to the right of the helm console at the lower helm in the salon. Here are its functions using the same code as for the AC panels:

Key:

- “B” = “Breaker”
- “S” = “Switch and Breaker”
- “WL” = “Warning Light”
- “MS” = “Momentary Switch”
- Green = Leave this Breaker on Always
- Yellow = Use when Item is Needed
- Red = Use with Caution and be sure to turn off as soon as finished

<table>
<thead>
<tr>
<th>BREAKER OR SWITCH</th>
<th>USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port and Starboard Engine Start/Stop Breakers (2)</td>
<td>S Turn on power and protect engine DC circuits</td>
</tr>
<tr>
<td>Engine Room Blower Breaker</td>
<td>S Turns on engine room blowers (rarely used)</td>
</tr>
<tr>
<td>Horn</td>
<td>MS Blows horn</td>
</tr>
<tr>
<td>Batt Parl [Battery Parallel]</td>
<td>MS Parallels start and house battery as long as depressed. Rarely used.</td>
</tr>
</tbody>
</table>
Main DC Breaker Panel

The nerve center of the DC electrical system is the DC circuit breaker panel by the helm. On this panel are the switches that control power to the boat’s various systems.

As for the breaker panel itself, just as in your home, most of these switches are true “circuit breakers”: they feed power to somewhere in the boat where there is another switch which, in turn, turns the item on and off. An example of this would be the circuit breakers for the horn and electric head. If the breaker is turned on, the horn won’t work unless you push the horn button, and the head won’t flush unless you are there in the head compartment to operate it!

But some of the other breakers also serve as the switch for the item. An example of this would be the navigation light breaker.

<table>
<thead>
<tr>
<th>BREAKER</th>
<th>USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC Mains</td>
<td>Main switch for this panel</td>
</tr>
<tr>
<td>Wiper</td>
<td>To windshield wiper panel over helm</td>
</tr>
<tr>
<td>Navigation Lights</td>
<td>Turns on navigation and helm lights</td>
</tr>
<tr>
<td>Instruments</td>
<td>Turns on fuel gauges, steering wheel, and water counter</td>
</tr>
<tr>
<td>Courtesy Lights</td>
<td>Top switch on wall next to helm seat</td>
</tr>
<tr>
<td>Anchor Light</td>
<td>Turns on anchor light</td>
</tr>
<tr>
<td>Spreader Light</td>
<td>Turns on spreader lights</td>
</tr>
<tr>
<td>Cabin Lights Fwd</td>
<td>To forward cabin lighting</td>
</tr>
<tr>
<td>Saloon Lights</td>
<td>To saloon lighting</td>
</tr>
<tr>
<td>Cabin Lights Aft</td>
<td>To aft cabin lighting</td>
</tr>
<tr>
<td>Engine Room Lights</td>
<td>Turns on engine room lights</td>
</tr>
<tr>
<td>Shower Drain Pump</td>
<td>To shower drain pump float switch</td>
</tr>
<tr>
<td>Fresh Water Pump</td>
<td>To fresh water pump pressure switch</td>
</tr>
<tr>
<td>Macerator</td>
<td>To macerator pump</td>
</tr>
<tr>
<td>VacuFlush</td>
<td>To VacuFlush pump vacuum switches</td>
</tr>
<tr>
<td>Trim Tabs</td>
<td>To trim tab rocker switches</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BREAKER</th>
<th>USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(3) Bilge Pump Auto/Manual Switches</td>
<td>See 4.4</td>
</tr>
<tr>
<td>Stereo</td>
<td>To stereo system</td>
</tr>
<tr>
<td>Galley/Head Vent</td>
<td>To galley &amp; head vent blowers</td>
</tr>
<tr>
<td>Saltwater Pump S</td>
<td>To seawater pump press. switch</td>
</tr>
<tr>
<td>Gas Stove B</td>
<td>To propane switch near stove</td>
</tr>
<tr>
<td>Oil [Change] Pump B</td>
<td>To oil change pump in E/R [Don’t use]</td>
</tr>
<tr>
<td>Auto Pilot B</td>
<td>To autopilot</td>
</tr>
<tr>
<td>Radar</td>
<td>To Radar and SIMRAD plotter.</td>
</tr>
<tr>
<td>Plotter B</td>
<td>To Furuno plotter</td>
</tr>
<tr>
<td>Search Light B</td>
<td>To searchlight control</td>
</tr>
<tr>
<td>Electronics B</td>
<td>To VHF units &amp; upper helm Furuno plotter</td>
</tr>
<tr>
<td>Electronics B</td>
<td>To wind and depth units</td>
</tr>
<tr>
<td>DC Outlets B</td>
<td>To DC “cigarette lighter” outlets (tends to cause radio interference)</td>
</tr>
<tr>
<td>Horn</td>
<td>To horn button</td>
</tr>
</tbody>
</table>

In general, when on the boat, you’ll have all the green breakers “ON” and all the yellow breakers “ON” as needed with the Saltwater Pump and Oil Change Pump “OFF” unless being used.
4G6: DC Voltmeter

To the right of the helm is an analog voltmeter measuring the voltage in the various batteries. Batteries are selected by the switch as follows: is selected by a “Battery Test” switch located to left of the meter. The switch positions are:

1 = Starting Battery
2 = House Battery
3 = Generator Starting Battery

Battery voltage ranges and their significance:

- 12.8 volts Fully charged battery, no charger or load connected.

- 12.5 volts or less Battery getting low.
- 11.0 volts or less Battery is considered seriously discharged.
4H: Electronics

The boat is equipped with extensive electronic equipment, including VHF radios, Radar/ GPS/ Plotters with displays at each helm; depth sounders; speed log; and an autopilot. The engines are monitored with electronic monitors with LCD displays (See "Engines")

Each unit is provided with a dedicated or shared circuit breaker in the DC power panel; this breaker must be on for the unit to be used. Then the unit’s own power button must have been depressed or its knob must be also be in the “ON” mode.

4H1: Electronics: Autopilot

The boat is equipped with a Furuno Autopilot System including a control unit at each helm. The autopilot breaker switch must be on for navigation data to reach other electronics on the boat!

For the unit to operate, be sure the breaker is on in the Power Panel.

Basic operation is simple:

**STBY/PWR** Turns the system on, or, if held for 3 seconds, turns it off. When on, the display will show the pilot’s status. “Stby” = standby.

**AUTO** Engages the autopilot to hold the heading that existed when pressed. When engaged, “Auto” (Autopilot) appears in the upper left corner with the compass heading below.

**NAV** Connects the autopilot to the Furuno navigation system when on an activated pre-plotted course. “Nav” appears in the display in front of the heading called for by the navigation system.

**TURN**. The TURN FUNCTION ON THIS VESSEL SHOULD NOT BE USED. Using the turn function in combination with the port or starboard button will put your boat into a u-turn, which we deem to be unsafe. We recommend instead taking advantage of this vessel’s hydraulic steering feature by manually steering around any object you wish to avoid. Put the autopilot on standby and then manually steer around the object. Then return to AUTO or NAV as desired.

**leftrightarrow** **BUTTONS** Decrease or Increase heading by one degree at a time; if held, by ten degrees at a time, only when in the AUTO- mode.

**(KNOB)** Turn to set a new heading, when in Auto.

For full details, see the Autopilot Manual.

Maintain a careful lookout when using the autopilot! It is an aid to comfortable cruising, not a replacement for an aware helmsperson! Remember, you can disengage it quickly simply by pushing “STBY”.

Section 4H: Electronics 4.21
**Standard Depth Sounder**

There is a standard depth sounder system at the pilothouse helm panel, with a repeater on the flybridge. It shows the depth BELOW THE KEEL. Operation of this Simrad system is described in its operating manual.

There is an additional depth sounder (Furuno) in the aft cabin. Both are turned on by the lower electronics breaker in the DC power panel.

**Simrad Sounder**

The Simrad system (plotter/Radar/large displays) has a built-in sounder/knotmeter function that can be called up on-screen at either of the helm stations, also providing depth-below-the-keel information. This provides redundancy for the vessel safety.

Because our waters are sometimes very deep, the depth sounders will not display or will stay on a high depth reading when the water’s depth is beyond its capacity.

Remember when backing up, or crossing a “tide line”, that turbulent water from the tides or boat’s screws (or those of another boat) can interrupt the sounding information received by the unit. Be careful!

Note that our Northwest waters are rocky and depths change rapidly. You should be especially careful to study your charts, and then check them often whenever running in depths of 50 feet or less, so that you don’t hit a rock! Just as our islands “pop up” to heights of 50, 100, or even thousands of feet in a very small horizontal distance, so do rocky obstacles!
**4H3: Electronics: Plotters/Electronic Charting Systems**

The boat is equipped with a Simrad plotter at both helm stations and a Furuno plotter at the upper helm station. Information is displayed on a large screen at both helms. It will always make your location easily identifiable.

Change of Latitude’s lower helm station computer is synchronized with its upper helm station Furuno Max Sea 3D plotter. To use these plotters for navigation, follow this 3-step process:

1. Turn on the Bering Sea panel power switch and lower helm computer as described in the Section 4H4 below.
2. Go to the flybridge and turn on the Furuno Max Sea Plotter by pressing the power button. When it is fully loaded, press the Roto key.
3. Return to the lower helm and restart the monitor by going to the Max Sea logo in the upper left corner of the screen, click to show the drop-down menu, scroll down and click “exit.” Then restart the program by double-clicking the Max Sea Time Zero shortcut icon in the upper left corner. Choose Navigation Mode on the first screen.

**Note:** The following breakers must all be on for this to work: Autopilot, Radar, Plotter, Electronics, Electronics.

**THE ELECTRONIC CHARTING SYSTEM IS NOT A SUBSTITUTE FOR CAREFUL STUDY OF TRADITIONAL PAPER CHARTS.** You are required by maritime law to use your paper charts for navigation information, especially since electronic chart technology does not always permit full cartographic details to show. The Electronic charts are for convenience only!

The system is described in its operating manual.

**4H4: Computer Navigation System**

A computer loaded with Max Sea XO navigational software can be run through the computer monitor at the vessel’s helm station. The user guide may be found by clicking the Max Sea symbol in the upper left corner of the screen and clicking on the question mark icon [?] which appears in the drop down menu.

To turn on the lower helm computer and monitor, press the power button on the Bering Sea panel. The Bering Sea panel is located above and to the left of the steering station, directly above the stairs to the forward cabin. Once the monitor is on, click the Max Sea program icon in the upper left of the screen.

Please abide by the following restrictions:

- **DO NOT use the computer for any other purpose.**
- **DO NOT remove the computer from the boat.**
- **DO NOT remove any connections from the computer.**
- **DO NOT make any internal configuration changes.**
- **DO NOT use this computer for internet access.**
**4H5: Electronics: AIS (Automatic Identification System)**

This boat is equipped with Class B AIS. The system is automatic and no inputs are required by the operator.

This system allows other vessels equipped with AIS to share and automatically update their position, speed, course and vessel information. This information is displayed on both the desktop computer monitor at the lower helm station as well as the Furuno chart plotter on the flybridge.

AIS is a valuable tool to aid your situational awareness and help prevent collisions. Your checkout skipper may demonstrate its use and the operating manual is onboard.

Please DO NOT make any changes to the AIS configuration.

---

**4H6: Electronics: Radar**

The boat is equipped with a radar set that displays on both the flybridge and at the pilothouse helm using the same displays as the plotter. This unit is used, combined with the electronic chart unit, for operation in restricted visibility, with the radar primarily serving as a device for collision avoidance while the chart unit provides position.

Proper and safe use of a ship’s radar requires lots of practice and careful study. While you are using the boat, you can have the radar on as much as you like to get used to the way it displays images, but for detailed operating instructions we refer you to the radar’s own complete manual.

---

**4H7: Electronics: Stereo/CD**

In the salon on the inboard end of the helm seat is a Stereo AM/FM receiver with a CD player. This is like an automobile unit. The “Front/Rear” speaker control (fader) shifts the sound between the boat’s inside and flybridge speakers.

An iPod docking station is atop the wet bar behind the salon helm seat, and it plays through the stereo radio.

---

**4H8: Electronics: SATELLITE TV/DVD System**

The boat has a satellite TV and DVD system in the aft port corner of the salon. The flat screen HD TV and the Blu-Ray DVD operate conventionally. See manuals for details. There is a SeaTel antenna system to get satellite TV (see below). Only some stations are available in HD. There is a Dish Network help line: 800-894-9131. This number works only in the U.S., not in Canada. Also, we have found that the agents can offer only very basic help since many of them are not familiar with the Sea Tel system or how Dish Network works on a boat.

Reception is generally good at marinas, anchorages, and while underway in WA. However, clouds, fog, heavy rain, and boat motion may affect picture quality and availability. Being too close to a high shoreline that blocks the southern sky may prevent reception. When the stern faces south, the boat’s mast may also interfere with reception.

Change of Latitude has a basic cable package from Dish Network of approximately 190 stations, including some Seattle/Tacoma local stations, plus a sports pack with Red Zone. There is a printed list...
that is on the countertop under the TV remote basket. This list was accurate as of 6/01/2016, but keep in mind that Dish Network may change the package from time to time. You can also review the channels by pressing the Guide button on the Dish Remote. Repeated presses of this button will show you: 1) My Channels, 2) HD Channels, and 3) All Channels, including ones we do not get. To use the system:

1. Be sure that the TV and cable box cords are plugged into the socket beneath and to the left of the TV screen. You should see a small red light under and on the far right of the screen. This indicates that the TV is in standby mode.

2. Check the Sea Tel panel, located on the bulkhead above the lower helm station. If the SeaTel system is off, press the blue power switch. Do not press the white buttons.

3. Turn on the cable box with the Dish remote by pressing the large red power button. A green light on the cable box will appear. Then, press the smaller red “TV” button on the Dish remote. The red light on the TV will blink and it will turn on after several seconds. If the TV has been recently used, everything should now be operational.

4. If not, you will see program information downloading first. Downloading the guide may take several minutes.

5. To select a station scroll the Channel up and down buttons on the remote. You may also press Guide on the remote or enter the number of the station you want manually on the keypad.

6. Any problems can often be resolved by unplugging the power cord and waiting 10 seconds before plugging it back in. This will initiate a download of the channel guide and should take less than 10 minutes.

If Dish Network has made any changes or upgrades since the last time the TV was used, the guide may not allow you to make selections immediately. Instead, it will begin a download of a new channel guide, taking 10 minutes or less.

The DVD player works in a standard fashion. First, make sure the Satellite TV and the DVD player are on. Next, use the separate, labeled DVD remote. Press the eject button (upper left). Insert the DVD. Press the same button to close the DVD drawer. The video will play after a few seconds. Press the same button to eject the DVD when finished playing. Then close the drawer. To return to watching the satellite TV, press the source button on the DVD remote twice.

**4H9: Electronics: VHF Radio (Fixed)**

There is a Standard Horizon VHF radio at the lower helm station to left of the radar/plotter display. The radio is designed for easy access to Channel 16, the hailing and emergency channel in the Northwest. In addition, it uses Digital Selective Calling for emergency communications. There is a second radio (ICOM) on the bulkhead above the lower helm station. Detailed instructions are in the manuals.
4H10: Electronics: VHF Radio, Flybridge

On the flybridge control panel there is an electrical receptacle for the Standard Horizon handset radio. **This radio is water resistant, but not waterproof.** Therefore, it should be plugged in only as needed for use. When not in use, the radio should be disconnected, removed from the FB, and kept in the small basket located on top of the cabinet under the TV in the main salon.

4H11: Electronics: Portable VHFs

There are two portable VHF radios with chargers in the aft corners of the salon for use on the dinghy, or ashore.

4H12: Electronics: Wind Speed & Direction

Change of Latitude is equipped with a Simrad wind speed and direction indicator. If turned “On” with the breaker in the DC panel operation it is entirely automatic. (See illustration top of page.)
4J: Engines & Transmissions

4J1: General Discussion

The main engines on the boat are John Deere 6068 SFM Turbocharged diesels each producing a maximum of 300 horsepower. These extraordinarily-reliable, rugged machines are the top-of-the-line, and can be expected to give you trouble-free, economical cruising.

The engines are controlled at the lower helm with a key and start button; at the upper helm there are stop and start buttons for emergencies.

On engine start, no long warm-up is required! Simply start the engines just before you leave the dock to begin in-harbor maneuvering.

Do not run the engines over 1400 RPM until the temperature gauge reads at least 140 degrees Fahrenheit.

Do not run the engines for long periods with the transmission in neutral, with no load.

Engine gauges are in two clusters of five (one cluster for each engine, port and starboard) at each helm. Each cluster has top left, engine oil pressure; bottom left, engine temperature; center, tachometer; top right, battery voltage; bottom right, crankcase oil level percentage. In the center of the panel is a rudder position indicator.

Engine Status is shown on the John Deere Engine Monitors, two LCD displays at each helm. Press the left button for the menu; the center rocker to scroll, and the right button to set. See the manual for more details.
4J2: Checking the Engine

The engines require a regular, daily check, since once underway, you will probably not check them while in use, tucked away as they are in the engine room. Please perform this check each morning (when the engine room is cool!):

Check the Oil

The oil level should be between the two marks on the dipstick located on the inboard side of each engine; the stick “pulls out” upward. Use a paper towel from the roll provided, wipe the stick, reinsert, and take reading. The distance between the two marks is about 1.5 quarts. Add only enough oil to bring it up above the “add” mark, say a quart, using the oil provided on the boat. The oil fill on the engine is a cap on the top front of the engine. **Do not put engine oil in the coolant fill, also on the top!**

After reinserting, be sure to tighten the cap, but do not over-tighten. DO NOT OVERFILL the crankcase (above the “full” mark), as the engine will quickly waste excessive lubricant. If oil is required often, check under the engine carefully to be sure there is no oil leak, and if there is, have it corrected promptly.

Check the Coolant Level

A heat exchanger coolant tank is located forward of each engine. Underway, this expansion tank will have coolant in it, and the cap on the heat exchanger on the engine should NOT be opened if coolant shows in the expansion tank. In fact, unless an engine appears to be overheating, or you see evidence in the engine room of a coolant leak, it’s probably best to just leave the coolant alone! If coolant is needed, determine if there is any sign of a coolant leak under the engine, and if there is, do not run the engine; if no leak, add coolant from the jug of pre-mixed antifreeze/corrosion inhibitor/water supplied on the boat. To add coolant, remove the cap on the coolant tank and add coolant from the supply on the boat. With the engine “cold”, add only to a level about 1” up from the bottom, no more: The coolant expands when the engine gets warm!

Check the Room

Whenever you’re in the engine room, ask yourself, “Does everything look right?”. Look at
the pads under the engine and transmission: while some drips are normal, there shouldn’t ever be substantial accumulations of any fluids!

**Check the Sea Strainers**

Once a week or immediately if any engine (generator or main) runs “hot”. The main engine strainers are forward under the raised bilge board grid. The genset strainer is under the forward side of the generator under the grid; the refrigeration sea strainer is by the engine strainers, and the sea water washdown pump strainer is under the forward stateroom hatch.

To check a strainer, shine a flashlight through it. While some “fuzziness” from trapped thin growth is normal, you should see the light clearly on the other side; if obscured, you should clean the strainer. See section 4.44 below.

### 4J3: Engine Controls

Change of Latitude is fitted with standard controls at each helm. The black-knobbed controls are the shift levers, the red-knobbed controls are the throttles.

### 4J4: Engine Monitor

Engine Status is shown on the John Deere Engine Monitors, two LCD displays at each helm. Press the left button for the menu; the center rocker to scroll, and the right button to set. See the manual for more details.

### 4J5: Engine Operating Parameters

The following parameters are estimated based upon the John Deere 6068SFM operating parameters from the manufacturer.

<table>
<thead>
<tr>
<th>RPM</th>
<th>Speed</th>
<th>Fuel Consumption</th>
<th>Naut. Miles/Gallon</th>
</tr>
</thead>
<tbody>
<tr>
<td>1600</td>
<td>8.5</td>
<td>6.0 GPH</td>
<td>1.41</td>
</tr>
<tr>
<td>1800</td>
<td>10.0</td>
<td>7.2 GPH</td>
<td>1.38</td>
</tr>
<tr>
<td>2000</td>
<td>11.5</td>
<td>10.8 GPH</td>
<td>1.06</td>
</tr>
<tr>
<td>2400</td>
<td>14.0</td>
<td>18.5 GPH</td>
<td>.76</td>
</tr>
</tbody>
</table>
4J6: Engine Synchronizer

Change of Latitude is fitted with the excellent Glendinning Engine Synchronizer. Here are the operating instructions:

**Engaging the Synchronizer:**
1. Be sure the synchronizer breaker is “On”.
2. Increase the master STARBOARD engine to at least 900 RPM.
3. Turn on synchronizer by operating its on/off toggle switch at either helm station.
4. Push “slave” PORT throttle all the way forward. (This step is important because it allows the synchronizer to adjust slave engine RPM without moving all the throttle linkages.)
5. Thereafter, control speed of both engines with the lead (starboard) throttle.

**Dis-engaging the Synchronizer:**
6. Pull the Master engine throttle back to idle.
7. Toggle the synchronizer switch at either station.
8. Pull the slave throttle back to idle, and give it a little “burst” to be sure it has engaged.

4J7: Engine Transmissions

**Check the Transmission Oil Level**

Check the oil level once every two weeks, more often if a transmission shifts erratically, with the dipstick on the starboard side of the transmission. It is unlikely that any oil will need to be added. Be sure to check under the transmission for leaks! Low transmission oil is a serious matter.

With the engine idling, remove the transmission dipstick. Wipe it with a towel, reinsert it, and take a reading. If the level is below the add mark, stop the engine, add a pint of 30-weight oil (not multi-grade!) through the plug in the top of the transmission case, and then start the engine and measure again. Do not overfill, for to do so could cause the seals to “blow out”.

The transmission is fitted with an oil cooler.
4K: Fresh, Salt, & Waste Water Systems

4K1: Fresh Water Fill Location

There are three water tanks located in the lazarette under the stern edge of the hatches. These are filled by fill pipes on each. You need to fill the tanks individually. The tanks empty uniformly when used. Do not overtighten the water tank caps. Be very careful not to drop them into the bilge. They are very hard to retrieve. Water level may be checked with the water meter (see section 4K4).

4K2: Fresh Water Heater

After the water pump, water is distributed directly to the cold water faucet lines. In addition, it goes to the boat’s water heater. The heater uses two energy sources, (1) heat from the engine, so that whenever the boat is running, or has recently run, there is hot water; and (2) 110 volts AC from shore power or generator, if available and the heaters’ 110-volt AC breaker is “on”. The heater is insulated well enough to keep hot water overnight without power, provided you haven’t wasted a lot. The heater is in a stainless steel case outboard of the port engine in the engine room.

4K3: Fresh Water Pump

The water line from the tanks leads to the boat’s fresh water pump, located outboard of the port engine.

Provided the “F.W. Pump” circuit breaker is “On”, the pump will run whenever its built-in pressure switch detects low water pressure.

The “accumulator tank” by the pump provides a “pressure head” for the pump, so the pump doesn’t need to run so often. Instead, a pump cycle will provide for several minutes of routine water use before pressure diminishes and the pump starts again.

It is a good idea to turn off the fresh water pump breaker whenever leaving the boat for any extended period, lest a dripping faucet or broken hose cause the pump to run and waste your precious drinking water.

4K4: Fresh Water Meter

At the lower helm, above the helm console, there is a fresh water meter. It indicates how many gallons of water you currently have. It counts down the volume in the combined water tanks from 250 gallons. After refilling the fresh water tanks, press the red button on the fresh water meter. This resets the counter to 250 gallons.

4K5: Fresh Water Tanks

The combined tanks hold 265 gallons. (We set the water meter, when full, to 250 gallons to provide a buffer.) The tanks are in the lazarette (see photo above.)
**4K6: Salt Water Pump**

The boat has a salt water pump to provide pressure to the washdown faucet to starboard on the bow adjacent to the bow pulpit. The pump and its sea water inlet, valve and sea strainer are under the floor hatch just aft of the forward stateroom berth.

*It is a good idea to keep the seawater pump breaker in the DC panel “off” unless the pump is in use, lest the hose connections break or leak, filling the vessel’s bow with water!*  

**4K7: Waste Water**

Waste water from the sinks and showers (but not from the toilets) is dumped overboard in accordance with U.S. and Canadian law. From sink basins, the water simply flows by gravity overboard. Since the floor of the showers is below the water line, built in shower sump pumps operate to lift this water back above the waterline and dump it overboard.

*It is therefore very important that the “shower drain pump” breaker in the DC panel be left “On”.*
4L: Fuel System

4L1: Fuel System Concept

The diesel fuel aboard Change of Latitude is carried in two tanks of 300 gallons each. This gives the boat great cruising range, but it also means there can be a significant imbalance between the tanks if fuel is only used from one tank for an extended period.

You should understand that diesel engines pump an excessive amount of fuel from the tank, use the excess to cool the injection pump equipment on the engine, then return the unused excess to the tank! Typically, an engine might pump 40 gallons/hour, but use only three or four: The 36 or 37 gallons “makes the circuit” through the pump and back to the tank.

4L2: Filling the Fuel Tanks

With the large fuel tanks, you can fuel the boat pretty fast using a standard hose and nozzle (like those on auto gas pumps).

Fill both the tanks completely but do not spill fuel.

4L3: Fuel Fill Pipe Locations

Take the hose around the cockpit to reach the fill caps on the inside of the bulwarks adjacent to each side of the saloon midships.

4L4: Fuel Filters

Diesel engines require absolutely clean fuel to operate continuously. As a result, there are two kinds of fuel filters on the boat. The primary filters are mounted on the inner side of each fuel tank and consists of two filters controlled by a valve allowing one to be selected at a time (only one filter on the generator). That way, if one is clogged, you can switch to the other.

The secondary filter is on the engine itself. It is very fine mesh and is the final protection to be sure the engine’s fuel is absolutely clean.

If the engine stops, it is likely a filter is clogged. Follow through carefully, and remember you will have to prime the engine to re-start it. See the engine manual for this procedure.
4L5: Fuel Management

In the port aft side of the engine room there is a fuel manifold consisting of a set of valves for the fuel supply to the main engine and generator, and another set for the fuel return from these engines back to the ship’s tanks.

In addition, there are visual sight gauges at the forward end of each tank that let you see the level in each tank.

Failure to have the same tank supplying and returning fuel risks spilling fuel as the tank getting the “returned” fuel overflows.

4L6: Fuel Manifold

The Fuel Manifold is located directly on the inner side of the port fuel tank aft.

Note that all the valves on the manifold are vertical! This is the normal set and great caution should be used before they are set any differently.

Each engine has a fuel supply and, since extra fuel is pumped to the engine that is used to cool the engines injection pump, there is a fuel return line as well. At slow speeds, these return lines are pumping a lot of fuel; you must be careful not to set the valves so that a return line is switched to a tank for long that is not also supplying fuel, lest it overflow and pollute the water through the tank vents' overflowing!

The manifold has a clear fuel diagram on the front of its panel.

4L7: Fuel Measurement

Electric fuel level gauges are on the upper panel to starboard above the helm console. There are more accurate sight gauges on the forward corner of each tank.
4M: Furnace

4M1: Furnace Concept

The boat is equipped with a Hurricane diesel hot water circulating heat system. The furnace is in the lazarette and heats water, which is then circulated for heat throughout the boat. The hot water loop runs from the furnace through a) individual heat exchangers in all three cabins, b) the engine heat exchangers, and c) the electric heat exchanger, before returning to the furnace.

The furnace uses the same fuel as the engines, drawing diesel from the portside fuel tank. When running, the furnace burns about one quart of diesel per hour.

The water may also be heated electrically with the Comfort Hot system. However, the CH system requires AC shore power. Moreover, it provides only minimal heat – just enough to prevent the heating system components from freezing. Therefore, it is used only during long term/winter storage. When you board, the CH breakers in the main electrical panel will be off, and the heating system will be set in the diesel/furnace mode. Please do not reconfigure these settings or use the Comfort Hot system.

An expansion tank and overflow container are located under the corner section of the salon settee. As the water heats and expands, it may or may not flow from the metal expansion tank into the plastic overflow container. As long as there is coolant in the metal expansion tank, the system will operate properly. There may also be coolant in the plastic overflow tank, but it is not necessary for it to be filled to the line. If it does become necessary to add coolant to the metal tank, use the 50/50 coolant mix from the engine room. Do not overfill the metal or plastic tank. Do not remove the metal tank lid unless it is completely cool!

4M2: Furnace Operation

There is a remote master switch in the aft stateroom, and individual thermostats in both state-rooms and the saloon. To run the heating system:

Be sure the master remote switch is turned on. The system will not operate if this switch is off, regardless of the heating source.

Adjust any one or more of the thermostats to the desired level. The furnace will fire and begin heating the water.

Once the water is hot, the system will supply heat until the thermostats reach the set levels. Then the furnace will go through a cool down period and shut down. If the temperature falls below the set level on any thermostat, the furnace will turn on automatically and repeat its cycle.

If you don’t want heat in a given room, turn off its thermostat. If you want the heat totally off, all 3 thermostats [but not the remote master switch] must be off. Each room thermostat operates inde-
pendently. Therefore, if any one thermostat requests heat, the furnace will turn on.

Note: The heat generally comes on from aft to bow. This is especially true if all thermostats are turned on at the same time. Depending on initial water and outdoor temps, it takes about ten minutes for heat to begin blowing through the fans.

4M3: Furnace Exhaust Warning

Note the location of the exhaust aft on the port side of the boat! Care should be taken not to block this outlet with fenders or while rafting due to the very high temperature of the exhaust gases from the furnace.

4M4: Furnace Problems

If battery voltage gets too low the furnace will shut down to avoid running the batteries dead. After the batteries are fully charged, you must reset the furnace control by turning the remote furnace “on-off” switch “Off”, wait ten seconds, and then “On” again. The furnace then should operate.

4M5: Furnace Thermostats & Heat Source Switches

See illustrations to right.

Heat Source Switches:

Please do not change the position of the heat source switches. These switches are hidden under the left side of the aft cabin desk drawer. They should be properly set when you board the boat, with the pointed ends of both switches facing right so that 1) the pump switch points toward AC, and 2) the Comfort Hot switch points to OFF. See photo.
4N: Galley & Appliances

Change of Latitude is fitted with a number of appliances for your convenience. Most of these (like the microwave) are easy to operate, “just like a home appliance”; nevertheless, we will spend some time discussing these, as marine units have some features that are slightly different than home models.

4N1: Cooktop

The boat is equipped with a Force 10 propane cooktop with three top burners.

Propane gas is heavier-than-air. Therefore it must be treated with care around a boat so that we can be absolutely sure there is no gas escaping into the atmosphere to collect in the boat’s lowest spot, the enclosed bilges, to become an explosive safety hazard. For this reason, the propane tank itself is housed above the galley on the flying bridge where any leaked gas will simply blow away.

There is, of course, a manual gas valve on the propane tank used only when exchanging/filling tanks. There is a second valve, a “solenoid valve”, in the propane line immediately after the manual valve. This electric valve is controlled by a switch panel in the galley itself; in this way the cook can shut off the propane supply to the stove at its source when it not being used, simply by pressing a button. In addition, each stove burner is fitted with a “thermocouple”, a heat-sensing device that also controls the gas flow. When the gas supply is “turned on” to a burner, the gas will not flow unless (a) the burner is already on, or (b) the cook is holding the valve in the “light” position. If the burner goes out for any reason, the thermocouple will shut off the fuel automatically, assuring you of a safe galley.

To Light a Burner

Lighting a burner is easy and only takes five to ten seconds:

1. Be sure the propane valve circuit breaker in the DC panel is on.
2. Turn on the remote propane valve on the flybridge by operating the over-the-sink “Solenoid” switch (the pilot light on the switch panel will light).
3. Push in the selected burner control knob (all the way) and turn it past the “lightening flash” symbol; hold it in until it lights the gas. If needed, use the fire stick located in the top drawer below the sink.

Note: If a propane tank has just been serviced, it may take a while for air to get out of the line from the tank before the burner lights. This is normal!

4. After the burner lights, continue to hold the knob in for about 20 seconds after ignition while the thermocouple heats up before adjusting the flame to the desired intensity.
5. If ignition fails, check to be sure there is propane in the flybridge tank and the tank’s own valve is turned “ON”.

Electric solenoid propane valve switch above forward counter.
4N2: Microwave/Convection Oven

The microwave is conventional, operating just as one does in the home ashore. Be sure to remove the metal rack (the metal turn table should always stay in). The Sharp Microwave manual is in the bottom drawer under the lower helm seat.

4N3: Refrigerator and Freezer - Galley; Salon Freezer

The boat is equipped with two efficient Grunert refrigerators and a freezer.

The refrigeration runs on 110 volts AC only and requires AC power at least twice daily for an hour or two each time. Monitor temperatures to determine what’s required for your usage. Avoid putting unfrozen produce against the cold plates.

Refrigeration temperatures are controlled by the thermostat in the back of the refrigerator; set as required after allowing the refrigerator to stabilize for a few hours after loading. We usually find a setting between “9 o’clock and noon” to work best depending on outdoor temperatures.

The freezer and both refrigerators have battery-operated temperature sensors placed inside. The temperature of each unit is displayed on the Oregon Scientific Master Sensor for easy monitoring. The Master Sensor is located in the aft starboard corner of the salon, on the shelf above the settee.

4N4: Propane Tanks

The boat’s propane tanks are under the port side of the flybridge console under the chart cabinet. There are two tanks connected to a manifold which has a solenoid electric valve controlled from the galley.

One tank’s valve should be shut, the other open. When the tank is in use, reverse the valve settings and get it filled.
4P: Head Systems

4P1: Overview

The head system on this boat is reliable, straightforward, and easy-to-use.

First, a note about discharge of sewage:

It is forbidden to discharge untreated sewage in inland US. waters, an area that includes all US. waters in which this boat operates. The boat holding tank must only be emptied at proper pump-out stations if it is in US. waters. (This rule does not apply in Canadian waters. However, in Canada, courteous practice dictates that the holding tank be dumped only when outside confined marinas or bays, as we are sure the reader agrees!)

The boat is equipped with two marine heads. These heads each have a separate system which macerates waste and puts it into a holding tank. The holding tank is emptied either of two ways: by operating an overboard macerator pump controlled at the DC power panel, or by pumping using a shore side pump out station through the boat’s pump out fitting on the starboard side in the walk-around midships.

4P2: Head Operation

Overview

The head system on this boat is reliable, straightforward, and easy-to-use.

First, a note about discharge of sewage:

It is forbidden to discharge untreated sewage in inland US. waters, an area that includes all US. waters in which this boat operates. The boat holding tank must only be emptied at proper pump-out stations if it is in US. waters. (This rule does not apply in Canadian waters. However, in Canada, courteous practice dictates that the holding tank be dumped only when outside confined marinas or bays.)

The boat is equipped with two Master-Flush Marine heads. These heads each have a separate macerator pump which macerates waste and puts it into the holding tank. The holding tanks are emptied either of two ways: by operating an overboard macerator pump controlled at the DC power panel, or by pumping it using a shore side pump out station through the boat’s side-deck pump out fittings.

The Dometic Masterflush Heads

These premium heads are easy to use, odor free, and very reliable. They work with a macerating pump for each head.

These heads use about a pint of fresh water from the ship’s supply with each flush.

Each head is operated by push button switches on the nearby vanity (see photo to the right).

- Normal Flush: Press the right button (the one with a cartoon-toilet with the arrow down to empty the head and add water to the bowl thereafter.
- For a Temporary Larger Flush Or To Add water: Press the left button (the one with a cartoon-toilet with the arrow up) and release when enough water has entered.
- For a Permanent Larger Flush: Press the normal flush button and hold down for 5 seconds until the power light begins flashing. Then release. To reset it to a normal flush, press the normal flush button again for 5 seconds until the power light begins flashing. Then release.
**4P3: Holding Tank Pumpout & Macerator Pump**

There is a holding tank on the boat located in the engine room on its center line under the generator. The sewage from each head goes to the holding tank. If dumped overboard from this tank, the effluent passes through a through-hull valve (normally open) just aft of the holding tank in the engine room on the starboard side of the boat.

The boat is equipped with a tank level indicator in the aft head compartment, so it is easy to tell if the tank is full. Check this indicator every time you use the head, and don’t flush if full!

To dump the tank, use a shore side pumpout station connecting to the “Waste” deck fitting on the starboard side deck. If not in U.S. waters or a “no-discharge zone”, you can dump the tank overboard without a pumpout station by turning “ON” the macerator breaker pump and using the white timer switch to the right of the electrical panel.

*The timer will shut off automatically. Do not reverse direction of the timer.*

**4P4: Holding Tank**

There is a 40-gallon holding tank on the boat midships under the generator. The sewage from each head goes to the holding tank.

**4P5: Head Holding Tank Level Gauge**

The boat is equipped with a tank level indicator in the aft head compartment, so it is easy to tell if a tank is full. Check this indicator regularly and don’t flush if full!

*Green = Empty;*
*Yellow = Low;*
*Orange = Half full or More;*
*Red = Full.*
Section 4Q: Running Gear (Props, Shafts, Thruster)

4Q1: Shaft Seal

The vessel is equipped with a dripless shaft seal that is lubricated by water from the engine; the seal should be occasionally checked to be sure that there is not inappropriate water leakage. Adjustment should be rarely required. If needed, contact the charter company.

4Q2: Thrusters

Change of Latitude is equipped with a bow thruster with a “joystick” control at each helm. It will assist you in getting extra close to the dock after you have put the boat as close as possible using the engines...

Thruster Batteries

The thruster runs from its own bank of two 12-volt batteries which are charged by the ship’s charger from shore power or the generator, or by the alternators on the main engines. Because the batteries are only charged in this way, it’s a good idea if you’re not going to be hooked up to shore power that you run the generator for a while after shutting the main engine down if you’ve just used the thrusters for maneuvering before shutdown. The batteries are located under the forward berth.

Thruster Circuit Breaker

The bow thruster circuit breaker is in the forward stateroom under the panel under the berth mattress, mounted just inside the cabinet at its aft side.

Thruster Operation

1. Turn on thruster by pressing both “on” buttons simultaneously until the lights stay lit;
2. Then operate the “joystick” to run the thruster.
3. The thruster will only stay “ON” for about four minutes to protect it from overuse. After it turns off, you will have to turn it “on” again!
4. Operate the thruster from only one helm at a time, lest you burn it out!

Do not overuse the thrusters! Operating them in “jabs” of LESS THAN 10 SECONDS at a time should be enough...they cannot be run for extended times without shutting down when their thermal overload protective relays open!

4Q3: Trim Tabs

The boat is fitted with a set of Bennett Trim Tabs. These are wide “flaps” attached to the aft end of the boat, under the swim step at the trailing edge of the hull, operated hydraulically under the control of the skipper by rocker switches at each helm station.

At low speeds, up to approximately six knots, the tabs do little, and should be left in the “Bow Up” position (see below). But at speeds over this range, the tabs begin to take effect and will help the operator lower the bow for more efficient cruising.

The best way to adjust the tabs is to lower them while watching the “Speed” indicator to get the highest speed at a given throttle setting by adjusting “Bow Down”. If the tabs are “Bow Down” too much,
the steering will get mushy and speed may drop off a little, and the tabs should be adjusted “Bow Up” a little. Note that it will take time to make these adjustments; when the buttons are depressed, they need to be held 2-5 seconds each time for change to be felt and observed (the best way to see the effect of the tabs is by the knot meter and by observing the height of the bow relative to the horizon, most easily seen from the lower helm station).

Because the trim tabs are so large, THEY MUST BE IN THE FULLY-BOW-UP POSITION WHENEVER THE BOAT IS TO BE OPERATED IN REVERSE, otherwise the great water forces against the tabs may damage them severely, even tearing them off the hull!
4R: Safety Equipment

4R1: Safety - Equipment Listing

This vessel is equipped with complete safety equipment, listed on page 1.12

4R2: Safety - Fire Suppression System

The boat has a fire suppression system built in to the engine room. It is thermostatically operated, and if it operates because of a fire, it shuts down the engine lest all the fire suppressant be ingested by the running engine’s air requirements. A control on the helm (below the wheel slightly and to starboard) can then be operated to override the automatic shutdown feature. Another warning light is on the flybridge.

When the green light on this control is lit, the system is “armed” and ready for engine use. The switch should be left in the “Normal” position.

The system can also be manually operated, using the control by the lower helm. Pull the pin and pull the handle.

4R3: Safety - Warning Panel

Above the lower helm is this panel which has warning lights for the generator left on/running, exhaust temperatures, bilge pumps running, and engine room lights left on.

There are also controls here for the windshield wipers; pushing the knob activates washers.

A similar panel is on the flybridge.
**4R4: Safety - Warning Sounders**

Buzzers sound if either engine has low oil pressure or abnormally high temperature readings. You can identify the offending engine by looking at the gauges.

Even though the sounders can be silenced, do not use this feature lest it not be activated the next time there is an emergency!

**4R5: Safety - CO and Smoke Detectors**

Each cabin is equipped with a combination CO and smoke detector. See manual for details.
4S1: Sea Strainer Cleaning and Seacocks

The sea strainers on this boat are secure and reliable. They protect the engine, generator and refrigeration cooling systems from water-borne debris which might block internal equipment passages. If a sea strainer needs cleaning (see above regarding inspection) here is the procedure:

1. Follow the hose from the strainer to the valve at the hull. On one side of the valve will be a handle.
2. Turn the valve lever so it is perpendicular to the thru-hull or hose (parallel to the hull).
3. Unscrew the top of the sea strainer. Then remove the strainer by pulling it out the top of the assembly. Rinse the strainer thoroughly and, if necessary, remove any debris from the glass housing.
4. Reinsert the strainer, tighten the top cover and turn the valve back on (in line with the thru-hull itself or its hose).

**Failure to re-open the valves will overheat the engine or damage the pumps!**

The entire operation will take 5-10 minutes at most, and will assure you of cool engines.
4T:  Warning Lights & Alarms, Wipers & Washers

See the Safety Panel, Page 4.42.

4T1:  Windshield Wiper/Washer Control Panel

Above the lower helm is this panel which has warning lights exhaust temperatures, bilge pumps running, and engine room lights left on. There are also controls here for the windshield wipers; pushing the knob activates the washers.

4T2: Defrosters

The switch for the forward windshield defrosters is on the lower helm under the Simrad radio.
Section 5: “What to Do If” for Some Specific Concerns

5A: Anchor Chain Won’t Come Out of Chain Locker

The anchor chain is continuous, secured at both ends, and cannot tangle. But sometimes a pile of chain will fall over, and one loop of chain will fall through another loop. Usually you can clear this by grasping the chain where it exits the hawse pipe from the chain locker with your hands, and pulling it up or down to “jiggle” the loop out of the chain; you may have to retrieve some chain to do this, in order to have enough slack to jiggle it! It is rare when this will not clear the jam. The other solution: go below and clear the tangle in the chain locker. Caution: Turn off the windlass breaker to protect your hands when manhandling chain!

5B: Anchor Fouled, Can’t Raise It

This can happen if you “pull the boat to the anchor” with the windlass. You should move the boat under power until it is over the anchor, or, even better, slightly ahead of it before hauling. Usually this will clear it. Otherwise, take a line and form a fixed, loose loop around the chain. Weight the loop, and lower it down the line until it reaches the bottom, sliding down the chain. Then, using the dinghy, take the line forward past the anchor so that you can pull the anchor out, opposite the direction its flukes are pointing. This should help you to pull the anchor free.

5C: Anchor Windlass Won’t Turn

If the motor isn’t running, is the circuit breaker for the windless by the lower helm on? If the motor is running, is the clutch tight? Use the anchor windlass handle. Windlasses are equipped with a shear pin to protect them: if you sheared the pin, you will have to haul the anchor by hand using the emergency handle.

5D: Batteries (House) Keep Running Down

Have you run the engines or generator enough? Is something left on (like the engine room or mast lights, too many electronics, etc.) that is too great a load for the time you were not charging? Are you using the inverter for big jobs? Use the stove or shore power. Have you had the inverter on whenever plugged in to shore power or running the generator? You must, for the house batteries to charge!

5E: Engine Overheats

Is the drive belt for the water pump intact? Spare belts are in the engine room spares kit. Is the sea strainer clogged? See that section in this manual. Is the impeller shot? If sea strainer is clear and belt is good, this is likely. Change (spare in spares kit) or call a mechanic. Do not run engine if it overheats!

5F: Engine Won’t Start

If starter does not turn, is transmission in neutral? Try jiggling shift lever while pushing start button. Check battery, battery switches. Try starting with depressing the “Batt Parl” button. Or start generator, charge all the batteries. If starter turns, assume fuel problem: did you bump a fuel valve on the manifold at back of engine room? Make sure all are open, if one was closed, re-prime engine or call NW Explorations if you can’t do this (see John Deere engine manual).

5J: Head Won’t Flush

Is breaker on? Turn it on. Have you over-filled the holding tank? Pump it to allow more effluent to enter it. See the “Heads” section of this manual. If all else fails, just use only the other head.
**5K: HIT A FISH NET**

Engines in Neutral: don’t try to back off, you may foul the net more. Try pulling the boat back with the dinghy & outboard. Get assistance from the fisherman. You are responsible for damage you cause to a net!

**5L: HIT A LOG OR ROCK**

See EMERGENCY PROCEDURES, next chapter.

**5M: PROPELLER FOULED OR DAMAGED**

Best thing: have the prop checked by a diver. Check for vibration. Try turning shaft by hand in engine room, both should be turn-able with engine in neutral. Is shaft noisy, or does it load engine? Do not use that side and call NW Explorations. See emergency procedures, next chapter.

**5N: WATER (FRESH) WON’T FLOW**

Is there water in the tank? Is F.W. Pump breaker on? If capable, check pressure switch on pump, run manually if necessary.
Section 6: Emergency Procedures

6A: PROTECT YOUR LIVES FIRST...

Put on life jackets
Contact the Coast Guard with an emergency “MAYDAY” call.
If adrift, prepare to anchor to keep the boat from drifting into danger.
If the boat is really sinking, consider “beaching it” if necessary.
Launch the dinghy and prepare to board if necessary. Take a handheld VHF radio, if available.
Be sure to wear life jackets!

6B: ...THEN, WORRY ABOUT THE BOAT!

In a true emergency, you certainly are authorized to call for immediate commercial assistance as minimally required to assure the safety of you and the boat.

It is not an emergency, however, if neither you nor the boat are at risk. For all non-emergency assistance or mechanical repairs done by other, NW Explorations MUST give prior approval for you to be reimbursed.

6C: IF YOU THINK IT MAY NOT BE AN EMERGENCY:

If you have any concern about your long-term safety, contact the Coast Guard, either normally or using an urgent “PAN” call. Tell them that you are calling to advise them about your situation, so they can keep in touch.

Be sure that the status and safety of the boat and crew is someone’s responsibility while you sort out the boat’s problem. For example, delegate your mate to keep a watch for hazards, or to operate the boat on course slowly while you deal with the difficulty.

Here is a checklist for solving the problem:

1. Isolate it;
2. Get the manuals;
3. Get parts;
4. If necessary, call NW Explorations for help.

Over the years, most problems with boats are caused by misuse. Holding tanks overflow because they aren’t checked; heads clog because foreign matter (especially facial tissues and tampons) are put in them; engines fail because they run out of fuel, then must be “purged” to re-start. Use the boat carefully, and you’ll avoid these problems.

Almost all problems that are not operator-caused, i.e., that are boat deficiencies, are caused by pumps that fail, hoses and belts that break, and seawater strainers that get clogged. Generally, these problems are annoyances, and usually they are inconvenient, but they still can happen. Try to stay calm, collected, and be a professional by dealing with the problem in a businesslike, calm way. It will make everyone’s day a better one!

6D: HITTING A LOG, ROCK, OR DEBRIS ----- PLEASE DON’T!

Hitting a log is a real risk in our Northern waters because logging, and “log rafts,” are such a big part of our commerce.
If you hit a log:

- Did you put a hole in the boat? Idle the engine, then think: usually, you can tell just by where the noise of the hit came from. Check the bilges (don’t forget the lazarette area, where the rudder posts are) after putting the engine into idle and/or neutral, if necessary.
- If you did “hole” the boat, go immediately to the “If an Emergency” on the preceding pages.
- If no hole, and still idling, is the boat vibrating?
- If “yes,” put the engine into neutral, try accelerating it. If there is vibration or any unusual noise (grinding or squealing) shut down that engine and use the other engine. Proceed to the closest safe harbor. Contact NW Explorations.
- If there is no vibration, you probably did no running gear damage. Congratulations! Our diver will check your vessel’s bottom upon your return, just as after every charter.
Index

A

AC  1.1, 1.10, 3.1, 4.1, 4.6, 4.8, 4.10, 4.12–4.15, 4.18, 4.31, 4.35, 4.36, 4.38
AC power panel  4.8
Ammeter  4.10
Anchor  1.1, 1.2, 1.11, 1.12, 3.1, 3.2, 3.4, 3.5, 4.1–4.3, 4.8, 4.19, 5.1, 6.1
Anchor bridle  4.1
Anchoring  3.4, 3.5, 4.1
Anchor windlass  1.2, 3.2, 4.3, 5.1
Autopilot  4.19, 4.21

B

Barbeque  4.1, 4.4
Battery  1.10, 3.2, 4.4, 4.6, 4.8, 4.10, 4.15–4.18, 4.20, 4.27, 4.36, 5.1
Battery charger  1.10, 4.6, 4.10, 4.16
Battery parallel  4.16, 4.17
Berth  1.2, 1.8, 1.9, 4.16, 4.32, 4.41
Bilge pump  4.4, 4.6, 4.19, 4.43
Bow thruster  4.16, 4.41

C

Canvas  1.3
CD  4.24
Chain locker  4.2, 5.1
Chart  1.3, 1.9, 4.23, 4.24, 4.38
Checklist  3.2, 6.1
Circuit breakers  4.4, 4.19
Cleaning  4.45
Coast Guard  6.1
Cockpit  1.2, 1.9, 4.4, 4.33
Coolant  2.1, 3.1, 4.9, 4.28, 4.35

D

Davit  1.3, 4.5, 4.17
DC  1.1, 1.8, 1.10, 3.2, 4.1, 4.3, 4.4, 4.6, 4.10, 4.15–4.22, 4.26, 4.32, 4.34, 4.37, 4.39
DC power panel  1.10, 4.21, 4.22, 4.39
Deck chairs  1.11
Depth sounder  1.11, 3.4, 4.6, 4.22
Dinghy  1.2, 1.3, 1.11, 3.5, 4.5, 4.6, 4.17, 4.26, 5.1, 5.2, 6.1
Dryer  4.10, 4.14
DVD player  1.6, 4.24

E

Electronics  1.1, 1.3, 1.5, 1.10, 4.1, 4.19, 4.21–4.25, 4.26, 5.1
Emergencies  4.27
Emergency  1.3, 1.9, 1.10, 1.11, 4.3, 4.17, 4.25, 4.44, 5.1, 5.2, 6.1, 6.2
Engine  1.10–1.12, 2.1, 3.1, 3.3, 3.4, 3.6, 4.4, 4.5, 4.7–4.10, 4.12, 4.15–4.19, 4.27–4.31, 4.33–4.35, 4.40, 4.41, 4.43–4.46, 5.1, 5.2, 6.2
Exhaust  3.2, 4.8, 4.35, 4.36, 4.43, 4.46

Section 7: Index 7.1
F
Fenders 1.11, 3.3, 4.36
Filters 1.10, 4.33
Fire extinguishers 1.12
Flares 1.12
Flashlight 1.5, 4.29
Flybridge 1.2, 1.3, 1.4, 1.12, 4.5, 4.6, 4.22, 4.23, 4.24, 4.25, 4.30, 4.37, 4.38, 4.43
FM 4.24
Freezer 1.7, 4.38
Fresh water 1.11, 4.19, 4.31, 4.39
Fuel 1.2, 1.10, 1.11, 3.1, 3.3, 4.6, 4.7, 4.19, 4.33, 4.34, 4.35, 4.37, 5.1, 6.1
Fuel fill 1.2, 4.33
Fuel filters 1.10, 4.33
Fuel tank 1.10, 1.11, 3.1, 4.6, 4.33, 4.34, 4.35
Furnace 1.11, 4.35, 4.36

G
Galley 1.3, 1.7, 1.8, 3.3, 4.19, 4.37, 4.38
Generator 1.10, 3.2, 4.8, 4.9, 4.10, 4.11, 4.13, 4.15, 4.16, 4.17, 4.29, 4.31, 4.33, 4.34, 4.40, 4.41, 4.45, 5.1
Genset 1.10, 4.2, 4.16, 4.29, 4.43
GPS 1.5, 4.21

H
Handheld VHF 6.1
Head 1.8, 1.9, 1.10, 1.11, 1.12, 3.1, 4.19, 4.31, 4.39, 4.40, 5.1, 6.1
Holding tank 1.2, 1.9, 1.10, 3.1, 4.39, 4.40, 5.1, 6.1
Hose 1.11, 3.3, 4.31, 4.32, 4.33, 4.45, 6.1
Hydraulic 4.21

I
Inverter 1.10, 4.10, 4.11, 4.13, 4.15, 4.16, 4.17, 4.20, 5.1

K
Key 4.7, 4.27

L
Law 4.23, 4.32
Lazarette 1.2, 1.9, 1.11, 1.12, 2.1, 3.5, 4.6, 4.31, 4.35, 6.2
Life ring 1.12
Lifesling 1.12
Lines 1.11, 3.1, 3.2, 4.1, 4.31, 4.34
Log 1.11, 4.6, 4.21, 6.1, 6.2

M
Maneuvering 3.1, 3.4, 4.27, 4.41
Manuals 1.5, 4.24, 4.25, 6.1
MAYDAY 6.1
Meters 3.2, 4.8, 4.13
Microwave 1.7, 4.10, 4.12, 4.15, 4.37, 4.38
### O
- Oil 1.10, 3.1, 4.6, 4.8, 4.9, 4.19, 4.27, 4.28, 4.30, 4.44
- Oil leak 4.28
- Oil pressure 4.9, 4.27, 4.44
- Outboard 1.3, 1.10, 1.11, 4.6, 4.31, 5.2

### P
- PC 4.23
- Plotter 4.19, 4.22, 4.23, 4.24, 4.25
- Polarity 4.12, 4.13
- Prime 4.33, 5.1
- Propane 1.3, 1.7, 4.4, 4.10, 4.19, 4.37, 4.38
- Propeller 3.1, 3.3, 5.2
- Pump 1.2, 1.10, 1.11, 4.4, 4.6, 4.19, 4.29, 4.31, 4.32, 4.33, 4.34, 4.36, 4.39, 4.40, 5.1, 5.2

### R
- Radar 1.5, 4.19, 4.21, 4.22, 4.24, 4.25
- Radio 4.16, 4.19, 4.24, 4.25, 4.46, 6.1
- Refrigerator 1.7, 4.38
- Repairs 6.1
- Reset 4.11, 4.36
- Restart 4.9
- Restricted visibility 4.24
- Reverse polarity 4.12, 4.13
- Rudder 3.3, 4.27, 6.2

### S
- Satellite 4.24, 4.25
- Seacocks 4.45
- Searchlight 4.19
- Sea strainer 4.8, 4.29, 4.32, 4.45, 5.1
- Sea water 1.10, 4.9, 4.13, 4.16, 4.29, 4.32
- Shaft 1.11, 4.41, 5.2
- Shore line 1.11, 1.12, 3.4, 3.5, 4.2
- Shore power 1.2, 3.2, 4.8, 4.10, 4.11, 4.13, 4.15, 4.16, 4.31, 4.35, 4.41, 5.1
- Shower 1.2, 1.8, 1.9, 4.19, 4.32
- Spares 1.10, 5.1
- Starting 4.9, 4.10, 4.16, 4.17, 5.1
- Steering 1.11, 3.6, 4.21, 4.42
- Stereo 1.5, 4.16, 4.17, 4.19, 4.24
- Stern line 3.3, 3.5
- Sundeck 1.3, 4.5
- Synchronizer 1.11, 3.1, 4.18, 4.30

### T
- Table 1.4, 1.5, 1.6, 4.38
- Temperature 4.27, 4.35, 4.36, 4.44
- Throttles 3.3, 4.29
- Thruster 4.1, 4.16, 4.17, 4.41
- Transmission oil 2.1, 4.30

---

Section 7: Index 7.3
Trim tabs  3.1, 3.2, 3.6, 4.19, 4.41, 4.42
TV  1.5, 1.6, 1.9, 4.10, 4.14, 4.24, 4.25

V
Vacuum  1.10, 1.11, 4.19, 4.39
VHF  1.12, 4.19, 4.21, 4.25, 4.26, 6.1
Voltage  4.3, 4.8, 4.13, 4.16, 4.20, 4.27, 4.36
Voltmeter  4.3, 4.13, 4.20

W
Wake  3.1
Washdown  4.29, 4.32
Washer  4.46
Water fill  4.31
Water gauge  4.19
Water heater  1.11, 4.10, 4.12, 4.13, 4.14, 4.31
Windlass  1.2, 3.2, 3.4, 4.1, 4.2, 4.3, 5.1
Winds  3.3, 3.4
Windshield wiper  4.19, 4.43, 4.46