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## **NOTE:**

This handbook is intended to "steepen" the learning curve with your new Great Harbour trawler and help you enjoy it to its fullest right from the start. We have included lots of tips that we have learned from many miles of cruising. It is in no way intended as a substitute or replacement for the owner's manuals for your systems, equipment or appliances. These manuals are either included with your trawler information file or available from the pertinent manufacturer online.

While we believe all the information in this handbook to be factual – we cannot guarantee it. You may find something in this handbook that runs counter to your experience or to what is written in another owner's manual. If this is the case, please bring it to our attention for discussion. There are no additional warranties implied by the use of these procedures. We just wanted to make your life a bit simpler.

Enjoy your new Great Harbour trawler. It was designed and built with great pride right here in the United States of America. We look forward to having you as a "family" member for a long, long time.

Happy Cruising.

MIRAGE MANUFACTURING

## Your Great Harbour Warranty

### I. DELIVERY

- A. There is a lot of misunderstanding as to what is – and what is not – covered by the factory warranty. So, let's take a few minutes and go through the "punch list" process and warranty step-by-step. Then we will examine the proper procedures for having covered work done after you leave Reynolds Park marina.
- B. **Punch List** - First, when you take delivery of your new boat, there will likely be a "punch list" of unfinished items or apparent defects with your boat. We encourage you to put 40 or 50 hours on your engines in the North Florida area and we will steadily work on your boat to reduce the punch list to zero. After that, there is no such thing as a "punch list." When you have been cruising aboard your boat for six months or a year, we don't recognize the term "punch list" any longer. Now, there may well be a warranty item or repair that needs to be done – but the punch list only exists at initial delivery and for a very few weeks after that.
- C. **Dockage at Reynolds Park** - During the punch list period, typically 30-45 days after delivery, we will pay for your dockage at Reynolds Park marina. After a maximum of 45 days, if you wish to continue to stay there, you must pay for dockage and electricity directly with the marina. If you think this might be the case, I encourage you to discuss this with the Reynolds Park dockmaster as soon as possible to make sure he has space for your boat.
- D. **Furniture, Gelcoat and Other Finishes** – While we make every effort to ensure that your boat is a thing of beauty and a source of pride, you would do well to keep in mind that we are NOT Hinckley – nor do we try to be. We do not charge a million dollars for a 30-foot boat. Consequently, there may be some wood or finish mismatches and/or some minor flaws in the gelcoat that are difficult to detect – yet you can find them if you look. These are just a fact of life. You will make yourself (and us) crazy trying to have every tiny flaw corrected. Try to keep a sane perspective about this. Your boat will look fabulous for years to come – but you can't get all exercised every time you nick the gelcoat docking – or find a minor flaw in the woodwork – or see a slight surface crack in the gelcoat under your teak steps!

### II. THE WARRANTY – Here is a direct cut and paste of the warranty as it is written in the contract that you signed when placing the order for your new Great Harbour:

- 7. Seller warrants to the Buyer for a period of thirty-six (36) months from the date of delivery any part manufactured by Seller to be free of defects caused by faulty workmanship or materials under normal use and service. Seller warrants for a period of seventy-two (72) months from the date of delivery any major structural hull defects that would render the vessel unseaworthy.

A. During this period, Seller will repair or replace any part manufactured by Seller judged to be defective by Seller free of charge at its plant, or if impractical to return the part or the Boat to the Seller's plant, by an authorized representative of Seller. **Seller or his authorized representative must approve all repairs and replacements in advance and in writing.**

B. This warranty does not cover:

1) Paint, window glass, gelcoat, gelcoat cracks or finish, upholstery damage, plastic or wood finishes, rub rail, engines, engine parts, propellers, shafts, controls, instruments and any parts or equipment not manufactured by Seller. Any warranties made by the manufacturers of above items and any other items included in the construction of the Boat will be, whenever possible, passed on to the Buyer.

2) Blisters are covered under this warranty for a period of five years in the hull below the waterline.

C. This warranty is expressly in lieu of any and all other remedies and warranties expressed and implied. The Buyer acknowledges that no other representations were made with respect to the quality and function of the Boat, except those specifically made in this sales contract and its exhibits. Any consequential damages that may be incurred are excluded.

**III. Straight Talk From the Boss About Your Warranty** – (This was written by Ken Fickett a few years ago to explain the warranty in detail and to alleviate potential misunderstandings.)

*Included in your sales contract is the warranty for your vessel. I would like to take the time to be sure that you understand what we do and do not cover, and the steps you should take if you feel that you have a warranty situation. Remember, my goal is for you to have the best experience possible in your boat and enjoy the entire ownership experience to the fullest.*

*Even if you are positive that the problem you are having is not warranty-related, please contact Mirage before you do anything else. We can often save you money and aid you in a variety of ways; from assistance in negotiating work to be done by another party, to possibly sending a crew to do the work ourselves. Nobody is more qualified to work on your boat than our crew – who is familiar with all aspects of the design and construction of your boat.*

*Let's look at the warranty as it appears in your contract paragraph-by-paragraph:*

Seller warrants to the Buyer for a period of thirty-six (36) months from the date of delivery any part manufactured by Seller to be free of defects caused by faulty workmanship or materials under normal use and service. Seller warrants for a period of seventy-two (72) months from the date of delivery any major structural hull defects that would render the vessel unseaworthy.

*The first section of the warranty covers parts manufactured by Mirage Manufacturing. This would include most fiberglass parts, various brackets and other items not manufactured by some other parts supplier. The second part of this paragraph (72 months) primarily regards the big structural parts of your boat. It includes all the parts built by Mirage Manufacturing such as hull, decks, major fiberglass components, fuel tanks, etc. The qualifier is "...that would render the vessel unseaworthy." While you may develop some kind of problem after the initial 36 months, we are obligated to cure the defect only if the defect renders the vessel dangerous to be used.*

During this period, Seller will repair or replace any part manufactured by Seller judged to be defective by Seller free of charge at its plant, or if impractical to return the part or the Boat to the Seller's plant, by an authorized representative of Seller. **Seller or his authorized representative must approve all repairs and replacements in advance and in writing.**

*This is the paragraph that probably presents the most trouble. Remember what I said in the beginning, "please call." That is the most important piece of advice. It is imperative that Mirage Manufacturing be given the opportunity to act on its behalf to remedy your problem. Most warranty disputes arise from the boat owner not contacting Mirage, having work done and simply sending a bill to us expecting rapid reimbursement. With all due respect to the good marinas and boatyards that exist in America today, we feel that far too many charge exorbitant rates for work that is often done improperly or sometimes not at all. Additionally, it does not take much imagination to understand that some yards will try to convince you that other work done by the manufacturer was either done improperly or poorly. The minute you put yourself at the mercy of a boatyard or marina, get a good grip on your wallet. Their job is to separate you from as much money as they can. Unfortunately, they are rarely constrained by firm quotes or contracts such as Mirage Manufacturing was when we built your boat.*

This warranty does not cover: Paint, window glass, gelcoat, gelcoat cracks or finish, upholstery damage, plastic or wood finishes, rub rail, engines, engine parts, propellers, shafts, controls, instruments and any parts or equipment not manufactured by Seller. Any warranties made by the manufacturers of above items and any other items included in the construction of the Boat will be, whenever possible, passed on to the Buyer.

*This sounds like plain language to me, but you may wonder about some things. It does not cover all those things listed unless we used the wrong part in the wrong place or for*

*the wrong application. Every now and again we do something that we thought was a good idea but failed to read some tiny print that indicated we were not supposed to install it upside-down, as a for instance. If we screw up an installation, we will fix it. However, just having your favorite marina person say that we did it wrong is not quite enough. We need to have some kind of documentation that explains the problem and some idea of how we should have known about it. Again, communication is the key! If Acme Widget failed to explain how to properly install their Widget Wonder, and it fails, Acme Widget gets to pick up the tab. We try to include every piece of original documentation for your boat that we can. All warranties from manufacturers of parts and pieces for your boat should be studied to understand the idiosyncrasies of each manufacturer. We do not send in warranty cards for you. You get to do it.*

Blisters are covered under this warranty for a period of five years in the hull below the waterline.

*I think that's pretty clear.*

This warranty is expressly in lieu of any and all other remedies and warranties expressed and implied. The Buyer acknowledges that no other representations were made with respect to the quality and function of the Boat, except those specifically made in this sales contract and its exhibits. Any consequential damages that may be incurred are excluded.

*This last paragraph says that if one of our workers (or the sales guy) tells you, "Oh heck, that thing will last a million years; I guarantee it," he is only kidding and we will deal with him later. It also says don't send us the bill for a new car because your boat broke down and you ended getting back to the marina three hours later than expected only to find your car stolen just minutes before. Please buy towing insurance. It is a real bargain and can save you from spending hundreds of dollars to be towed off a sandbar or towed in when you run out of fuel. Please learn all you can about your boat. We are happy to spend as much time as necessary to ensure your knowledge of all the systems and how to do common maintenance and repairs.*

- IV. **Other Notes About Your Warranty** – Please remember that when a part or system not actually built by Mirage Manufacturing fails – it is the manufacturer of that part or system that is responsible for repair/replacement under any applicable warranties – not Mirage. Contact the manufacturer of the offending item for satisfaction. If you are getting nowhere with the manufacturer, let us know and we will try to "go to bat" for you with them if possible.

We want to re-emphasize: If you have a problem and are far from Mirage, call us anyway – regardless of whether you think it is warranty or not. We will do our best to take care of the problem in as expedient a manner as possible. The important point here is that if we are going to have to pay for it, we should get to say how/when it gets fixed! That's only fair (and spelled out in the warranty.)

# **Owner's Manual And Tips for Operation of Systems**

## I. Engine Room Maintenance:

### A. Checking Oil:

- 1.) Always check your engine oil with the engine shut off. Let sit for at least 10 minutes after shutdown before checking oil. The dipsticks on your Yanmar engines have a rubber seal at the top. This means that the oil will be sucked out of the dipstick tube when the engine is running and will not go back up into the tube until after you pull the dipstick out. So, often when you first pull the dipstick out, there will be NO oil showing! Don't panic, this is normal. If you leave the dipstick out for just a few seconds then reinsert it, you will see the true oil level.
- 2.) There are two marks on the dipstick. The difference between the high and low marks is a little over one quart on the 54hp mains and just over 2 quarts on the 75hp mains. Often, these engines seem to like to run about a half-quart low (indicated). So, if every time you check your engine oil, it seems to be a half-quart low, it is probably just blowing out that extra oil you are adding. Consider leaving it for another day to see if it goes any lower. Chances are that it won't as these engines rarely burn oil.
- 3.) When checking oil, I usually go into the engine room in the morning – or in the evening after the engine room has cooled down! I remove the dipstick from the port motor, wipe it off and set it on top of the motor. I then go to the starboard motor and do the same. Then back to the port and stick the dipstick in to check the oil. Then back to the starboard to do the same. I don't usually add oil to an engine until it is about a quart low. This way, I don't waste a lot of oil being blown out by an overfull engine.
- 4.) Oil should be added into the top of the mains at the orange (yellow) fill cap. Do NOT add oil to the silver metal cap. This is the heat exchanger and only coolant should be added there. There is also a second orange (yellow) oil fill cap located on the starboard side of the main engines (and genset) on the front of the mechanical injection pump. Oil can be added to either orange fill – it goes to the same place.
- 5.) The generator dipstick is yellow and hidden behind the starboard (outside) side panel of the genset. Check in the same way and add oil through the side orange (yellow) cap on top of the front of the fuel pump.

## B. Oil Changes:

- 1.) Yanmar recommends that the oil and filters in your mains be changed every 250 hours – and every 150 hours for the genset. Most of you have opted for the automatic oil changer system which makes these oil changes quite simple. Change one engine at a time so you don't forget something important – like putting fresh oil back in!
- 2.) Start by turning on the "oil changer" breaker on your main 12-volt breaker panel. Then go down to the engine room. You should have about 4 empty gallon oil containers for waste oil and enough of the proper oil. We use Rotella 15W40 on all our new boats, but other 10W30 or 15W40 oils can be used. Be sure to get API Service Category CH-4 for 54hp mains and API Service Category CD or higher for 75hp mains and gensets. Approximate capacities are:
  - 6 quarts for each of the 54hp mains
  - 7 quarts for each of the 75hp mains
  - 4 quarts for the 8kW genset
  - 5 quarts for the 13kW gensetYou will also need the proper oil filters for your engines:
  - Yanmar # 129150-35152 for the 54hp mains
  - Yanmar # 119005-35100 for the 75hp (16-valve) mains
  - Yanmar # 119305-35151 for the 8kW Maspower genset
  - Yanmar # 129150-35152 for the 13kW Maspower genset
- 3.) Open the orange fill cap on top of the valve cover on the starboard main engine. Flip open the plastic cover on your white oil changer (generally mounted on aft engine room bulkhead). There should be a yellow valve labeled "starboard." Open this valve. Uncoil the hose on the side of the oil changer and put the end into an empty oil container. There is a two-way electrical switch on your oil changer. Lift this switch up and hold it. You should hear the pump running and oil should start running into the empty container. If you hear nothing but bubbling noises – and no oil is going into the container, flip the switch and hold it in the down position. You should now see and hear oil going into the empty container. When that container is full, stop pumping and put a fresh container under the hose. When there is no more oil coming out of the hose, the engine is drained. Cap both used oil containers, put a plug of paper towels in the end of the oil hose and secure it up out of the way so it doesn't leak all over the engine room.

- 4.) Take a bunch of rags and jam them in under the starboard engine oil filter. Better than this is cutting the top off an old Clorox bleach container or plastic oil container and fitting it under the oil filter to catch spills. Use one of your trusty strap wrenches to loosen the oil filter. Unscrew it the rest of the way by hand and let it drop into your Clorox bottle top. Place it into a zip-lock storage bag for disposal along with the oily rags.
- 5.) Lubricate the top gasket of the new oil filter with a bit of oil and screw it on HAND-TIGHT. Add about a quart less than rated capacity of fresh 15W40 Rotella oil to the engine through the top orange fill cap and replace cap. Wait a minute for the oil to work its way down to the oil pan and check oil with the dipstick. If it is at the upper level, you are finished with this motor. If not, add a little bit more oil and recheck. Repeat process for port motor.
- 6.) The generator oil change is similar; however, there is a petcock on the oil drain on the genset to open before you can suck the oil out of the generator motor. Be sure to close this petcock when the oil is all drained out of the genset. Also, you will probably find it easier to add oil to the generator via the orange fill cap on the front of the fuel pump (starboard side of generator.) Note: Engine oil for any of the diesels can be added to either orange fill location.
- 7.) Do yourself a favor and write the engine hours and date on the oil filter with a sharpie marker.

### C. Checking Transmission Oil Level

- 1.) The first thing to remember when checking transmission oil level is that the little orange dipstick caps are extremely fragile. Be very careful taking them out and do not screw them in too tight.
- 2.) Checking transmission oil should be done with the engine cooled down and not running. Unscrew the dipstick, remove it and wipe it off. Re-insert but do not screw down. Remove again carefully and read level. There is a scribed mark on this dipstick; your oil should be at least to this level. If the oil is too clean and you cannot see the level clearly, roll the end of the dipstick on a clean paper towel. You should be able to see the level where the oil dampens the towel. When replacing the dipstick, be sure the o-ring is still in place.
- 3.) If you need to add oil, we use Chevron Delo 400 SAE30 Heavy Duty Motor Oil – but any API Service Category CD or higher SAE30 or SAE20 can be used. The transmissions hold about 2.1 quarts each and Yanmar recommends they also be changed at 250-hour intervals.

#### D. Other Maintenance:

- 1.) Engine belt tension can be checked by taking hold of the belt behind the front belt cover and making sure it feels fairly tight. When you push on the middle of the belt with your finger, it should deflect about 3/8" if properly tensioned. You must remove the belt guard cover and move the alternator to adjust belt tension. Also, to periodically check belt condition, you will have to remove the belt guard cover from the front of the engine.
- 2.) Do not open the radiator cap on top of the heat exchanger unless the engine has cooled down to room temperature. You could be scalded. You can check coolant level by looking at the reservoirs on the aft bulkhead of the engine room. Add coolant to bring this level up to at least the "low" level on a cool engine.
- 3.) Occasionally the shaft coupling bolts become loose. Check these periodically. Same is true of the upper engine mount nuts. Keep all of these tight!
- 4.) It is a good idea to buy some oil "diapers" and leave them under the engines. Yanmars are great engines, but they tend to drool oil a bit. Small "seeps" are no problem, but "leaks" should be repaired. Having a diaper under the engine will help you locate those leaks and make engine room cleanup less onerous.
- 5.) If you are getting water leaking from your dripless shaft seals, they can be adjusted per the shaft seal instructions. Also, pulling back the seal and carefully wiping the faces of the seals with a clean rag can stop some leaks.
- 6.) Main engine impeller housing is located on the forward, lower, port side of the engine and the impeller is quite simple to replace. The genset impeller housing is on the front of the genset and is a bit tougher to get to – but still quite easy to replace. Be careful not to drop screws and remember to shut off the raw water seacock to the impeller you are replacing before opening the housing!
- 7.) Your impellers will last a long time due to the incoming water sea chest. To clean growth off the screen on the bottom of your sea chest screen, simply remove the sea chest clear cover and insert an electric pressure washer wand. Spray down to blow off all the growth. Replace the sea chest cover.
- 8.) You should generally leave the sea chest plug on the workbench and OUT of the sea chest. This allows the air and water inside to equalize as the boat moves and rocks.

## E. Basic Engine Room Checks

- 1.) In the evening, when you have stopped for the night and the engines have cooled down – or in the morning before leaving, you should perform your engine room checks.
- 2.) First, look around the engine room for obvious problems: leaks, drips, water in the bilge, loose bolts. Then do your oil level checks on ALL THREE engines. Visually check the shaft coupler bolts for any obvious signs of loosening. Grab the coupling and rotate it to see ALL the bolts. Grasp each of the eight top motor mount nuts and try to unscrew by hand. If any of them are loose, tighten immediately. The outside aft nut on the port engine is the only tough one to reach.
- 3.) Grab hold of the cables for throttle and transmission to make sure the mount screws are tight. If these screws loosen, you could have an engine stuck in gear or at wide-open throttle.
- 4.) Take a glance at the Racors to check for leaks and feel the battery box tops for excessive heat to make sure that there are no potential problems.
- 5.) Check to see that there is engine coolant in the overflow bottles on the aft engine room bulkhead (generator overflow bottle is inside hush box.)

## F. Underway Engine Room Checks

- 1.) At least once during a day of cruising you should perform underway engine room checks. This is a lot easier for you N-model owners with a walk-in doorway to the engine room – so you should check more often!
- 2.) Check vacuum readings on the Racors to keep track of any trends towards clogging.
- 3.) Check the fluid levels in the coolant overflow bottles.
- 4.) Check for leaks – oil, water or fuel.
- 5.) Check for excessive engine vibration. Keep in mind that it is normal for one engine to vibrate slightly more than the other.

## II. Fuel System:

### G. Temporary Fuel Filters:

- 1.) There are five small metal temporary filters inline just above your fuel tank in the engine room. These are simply to filter out the really large particles of fiberglass in the new tank. These filters should be removed and discarded at the 50-hour engine service.
- 2.) To remove these filters, make sure you have plenty of rags or paper towels handy. Loosen the hose clamp above the first temporary filter and the hose clamp at the tank. Pull the hose off of the top of the temporary filter and then plug it with a rag or paper towel. Quickly pull the temp filter and short hose off the top of the tank and discard. Pull the rag or paper towel out of the end of the hose and connect it back to the top of the tank. Tighten the hose clamp. Repeat for the other four temporary filters and pump each Racor to bleed out any air. Properly dispose of oily rags and filters.

### H. Racor Operation:

- 9.) You have two separate Racor filters on a manifold for each engine. The genset only has one Racor. These Racors are equipped with 10-micron filter cartridges. Your engine-mounted filters are small spin-on style cartridges and equipped with 8-micron filters. This means that the Racors ARE your primary filtration. If there is going to be a clog, it will be in your Racor. This is good because you have another Racor that you can easily switch to BEFORE your engine starves for fuel completely. You will probably still want to change out the inexpensive engine-mounted fuel filter at engine services, but with our system, you should not have one clog and cause an engine to fail.
- 10.) Label your Racor filter cartridges with hours and date when you switch over to it – not when you install it. Having it hang on the bulkhead doesn't hurt it a bit. It doesn't begin to filter until you actually switch over to it. If a filter on your manifold has nothing written on it, it should be a fresh, new Racor ready to switch over to when necessary.
- 11.) There is an arrow molded into the black switch lever between each pair of Racors. The arrow points to the active filter. To switch to the other filter, simply twist the lever so that it points to the opposite filter. Then pump the hand pump on top of that filter until "hard" to bleed out any air that might be present.

- 12.) There is a vacuum gauge above the manifold on each set of Racors with a scale from zero to 30. This will (usually) tell you the condition of your filters. A climbing gauge (counterclockwise) indicates that your Racor is becoming fouled. Typically, the gauge will show anywhere from 0-10 on a brand-new filter. When this climbs above 20, it COULD indicate that you are getting close to having the engine start starving for fuel. However, try pumping the hand pump above the filter in question. You should be able to pump the Racor down to almost zero. Stop pumping and look at the pressure gauge. If the pressure comes back up to the same level after a few seconds, it is probably a clogging filter. If it stays down at a lower level, you might just have had a piece of fiberglass or junk trapped in the line. If it doesn't seem to pump up hard, you probably have an obstruction in the pump valve.
- 13.) The vacuum gauge on newer boats also has a movable "redline" and a red "tell-tale" that indicates high vacuum pressure.
- 14.) Water can be seen as a clear liquid below the red diesel fuel in the clear plastic bowl on the bottom of the filter. Drain water by simply opening the black drain knob and draining into a container until no water can be seen.

## B. Changing Racor Cartridges

- 1.) You will need two large size strap wrenches to change Racor cartridges. Make sure that the arrow on the manifold lever points away from the Racor you plan to change. Get LOTS of paper towels and bunch them up under the Racor to prevent spills from getting all over the engine room.
- 2.) Start by draining the Racor into a container. I usually use an empty 16-oz. water bottle. One should hold all the fuel in a Racor and you can screw the top on after draining to avoid a mess. Loosen the black drain knob under the Racor to drain the fuel. Close the drain knob after draining.
- 3.) Then loosen the clear bowl on the bottom of the filter. If you take the cartridge off before loosening the bowl, it makes a mess and may take two people to remove the bowl on the floor. The space behind the filters is a bit tight and you may have to thread the rubber strap wrench around the filter. Put one wrench on the body of the filter and the other around the clear bowl. Loosen the bowl.
- 4.) Now, remove the strap wrench from the bowl. Remove and reverse the strap wrench on the cartridge. Loosen the cartridge and remove the strap wrench completely. Carefully remove the cartridge from the manifold. There will still be some fuel in it so don't tilt it when you remove it.

- 5.) Remove the clear bowl from the bottom of the cartridge and lay it aside to clean later. Carefully drop the cartridge into a heavy-duty zip-lock storage bag. Make sure that the rubber gasket is on the top of the cartridge. If not, make sure to remove it from the manifold as you will be putting a new one on with the new cartridge.
- 6.) Make sure that the bottom rubber gasket is not stuck in the clear bowl. Clean the bowl with paper towels. Take your new filter cartridge and locate the two new rubber gaskets. Figure out which one is the bottom gasket and install it in the bowl as indicated by the diagram that comes with the filter. Put a little diesel fuel on your fingertip and lubricate the top of the gasket where it contacts the filter cartridge. Screw the bowl onto the new cartridge and tighten hand tight only!
- 7.) Now locate the new cartridge top gasket, insert as per the instructions in the top of the filter cartridge and lubricate the top surface with a little diesel fuel on your fingertip. Set aside for now.
- 8.) Look under the filter mount and you will see a little rubber one-way flapper valve. Carefully pull this valve down and check to see if there is a small ball of fiberglass fuzz lodged in the hole. If so, remove it. This is quite common in new boats.
- 9.) Screw the new filter cartridge back on HAND TIGHT only. Prime the new filter by loosening the primer screw on top of the housing, switching the lever back to point to this filter and pumping the hand pump until fuel starts to come out of the bleeder. Now tighten the bleeder screw and hand pump until hard. Switch back to your other filter. Your newly installed Racor is ready to go. Clean up any mess and dispose of all waste fuel and oily rags properly.

### C. Troubleshooting your Racors

- 1.) If the pressure on one of the Racor vacuum gauges has climbed above 20, check to see if it is just an obstruction by trying to pump the rubber valve until it gets hard (usually around zero). This should be done with the engine running. If the pressure goes right back to the high level, you may be replacing a Racor filter soon. If you cannot pump it up – or pumping it doesn't seem to be doing anything, you may have a ball of fuzz caught in the pump or in the little one-way flapper valve. This is generally not a cause for alarm. Just drain and remove the filter cartridge as outlined above (you can leave the bow attached though) and pull out the obstruction from the flapper valve. Reinstall the filter cartridge and pump to prime.
- 2.) You will know that it is time to change a Racor for sure when one of your engines starts to lose rpms. This becomes obvious as the engine will fall dramatically out of synch. Giving more throttle only

makes the rpms drop further. You should go into your engine room, switch over to the other Racor on that engine and pump up to bleed. This should solve your problem immediately and rpms should increase. It is a good idea to change over your other Racor at this time too to prevent the other engine from starving. Change the bad Racors at your next stop. Don't forget to label the Racors you just switched to with date and engine hours.

- 3.) If you run out of fuel, change an engine fuel filter or starve an engine for fuel, you will probably have to bleed the engine before it will start again. First, get plenty of rags or paper towels and stuff them around the engine fuel filter housing. There is a small bolt on the side (top on older boats) of the housing that is your bleeder screw. You can tell which one it is as it is a single bolt and has a copper washer/gasket under it. Loosen it slightly and you should see bubbles and fuel leaking out. Give the Racor pump a few pushes and you will see still more bubbles and fuel. Pump the Racor (or on the newer Yanmars, the pump knob on top of the filter housing) until there are no bubbles – just fuel coming out of the bleeder. Tighten the bleeder screw and pump up the Racor until hard. Clean up ALL spilled fuel and dispose of rags or paper towels properly. Start your engine. If the engine starts for a few seconds and then dies, then you did not get all the air. Quite often, pumping the Racor primer pump while the engine is beginning to starve for fuel will clear the air bubble. If not, repeat the bleeding process. Note: If you ran the engine out of fuel and have not been able to get the engine running even by repeating the bleed process, you may have to bleed the injectors to get all the air out. See the owner's manual for details on this process.
- 4.) If you see high vacuum levels on your Racor gauge and pumping does not reduce them, try switching over to the other, fresh Racor. If the vacuum gauge is still reading high, chances are its capillary tube is clogged. This is really no big deal as we mentioned above, you will be made aware of a failing Racor by a loss of engine rpms.
- 5.) If your genset starts to lose rpms due to a failing Racor, you may not notice. It will probably shut off because of an "underspeed" fault before it completely starves for fuel. If you feel this might be the case, shut down your generator and go through the process of replacing the Racor cartridge as outlined above. You will probably have to bleed the generator fuel system too.
- 6.) Bleed genset by loosening vent screw on top of and in the center of the genset-mounted fuel filter housing. Push and hold the bleed button on the genset panel to run the electric fuel pump until the air bubbles stop coming out of the vent screw. Tighten vent screw and restart generator.

## D. Fuel Polishing System Maintenance and Operation

- 1.) Your fuel polisher is the large yellow and black filter located on the forward engine room bulkhead next to the Racor panel. It operates by an electric 500-gph pump which draws fuel from the bottom aft end of the fuel tank, sends it through the 10-micron Racor FBO-10 filter unit and redeposits the polished fuel in the forward end of the fuel tank. The polishing operation can be done at any time, but is most effective when traveling in a seaway – or when refueling your boat. This ensures that stirred-up sediment and/or water will be picked up and caught by the FBO-10 filter cartridge. Obviously, you can't polish too often!
- 2.) To operate your fuel polisher, first turn on the "Fuel Transfer" or "Transfer Pump" breaker on your main 12-volt panel. If you have a yellow-handled lever on your FBO-10 that reads "Transfer" and "Polish," make sure it is set to "Polish." Then simply flip the switch mounted on top of the transfer pump. Polish for as long or short a time as you wish. With a clean FBO-10, you can polish up to 500 gallons in an hour. After polishing, turn off the switch on the pump and it is also good practice to turn off the breaker at the panel.
- 3.) It is a good idea to check for water 10 minutes after fueling your boat by running the pump for about 20 seconds – no more – and then opening the tap at the bottom of the filter assembly (while holding a suitable receptacle underneath to catch what drains out). Run the tap until fuel comes out clean. If water is present, it will come out first, so no water immediately means that no water has been picked up by the pump. You are good to go.
- 4.) To remove larger volumes of water from tank, proceed slowly; repeat the 20-second-and-drain process listed above until clean fuel drains. Running the pump in longer bursts will only recirculate the water back to the front of the fuel tank.
- 5.) There may be a pressure indicator mounted on top of your fuel polisher. This is generally a simple sight glass that shows green when the filter is good and red when it is time to change it. If you do not have an indicator on your polisher, you will know that it is time to change the filter when the fuel line between the filter and the pump starts to flatten out from the vacuum being drawn. There is an optional vacuum gauge available from Racor for this unit to replace the indicator. Contact Mirage if you are interested in purchasing this.
- 6.) Changing the filter involves first draining fuel out of the filter housing through the water drain at the bottom of the housing into a suitable container. Then loosen the four large X-nuts holding the filter housing together. Giving the lower black housing a bit of a twist should drop it off of the upper housing. Remove the old filter

and O-ring carefully and discard. Insert the new filter and O-ring and reassemble the housing. Open the brass bleed valve at the top of the housing and turn on the transfer pump to bleed air out of the housing. Close the bleeder and the polisher is ready to go again. Having another person assist you may ensure that you don't spray fuel all over the engine room during this operation!

#### E. Transferring Fuel

- 1.) If you have a watermaker, you may have opted to have us convert one of your water tanks to hold fuel. Since fuel is only drawn from the main, center tank, you must transfer the fuel from the auxiliary side tank to the main tank in order to use it. This is done with your fuel polishing system.
- 2.) Prepare to operate fuel polisher (turn on breaker, etc.) Flip the yellow-handled lever on the polisher to indicate "transfer" rather than "polish." Turn on the switch on top of the transfer pump. All the fuel being transferred from the side to the main tank is also being polished.
- 3.) Keep careful track of how much fuel you are transferring. If you overflow your main tank, you will spray fuel out of the overflow into the water or on your deck. Or worse, you could possibly rupture your main tank. Figure 500 gallons per hour. It might be a bit less if the filter is dirty, but at least you won't overflow your main tank. I recommend transferring fuel only when you are certain that the amount in your side tank will ALL fit in the main tank without overflowing.
- 4.) Do periodically transfer fuel into the main tank before refueling boat and then fill your side tank with fresh fuel.
- 5.) Be sure to put yellow-handled lever back to the "Polish" position after transferring fuel.

#### F. Checking Fuel Level and Fueling your Boat

- 1.) You can check your fuel level with your gauge (helm or engine room depending on the age of your boat) or with the dipstick. You should also have a VERY good idea of fuel left based on your fuel burn history. Obviously, this will take keeping a careful log and fueling several times before you can estimate your fuel burn accurately. Keep in mind to also try to estimate generator fuel burn here.

- 2.) To check fuel level with the dipstick, slowly unscrew the dipstick while holding an absorbent pad or wad of paper towels close around it. If the tank has been recently filled, there could be pressure built up which might allow fuel to spray out of the hole. Remove the dipstick carefully. If you have a threaded rod dipstick, it is almost useless to try to determine the fuel level on it. Put the dipstick aside and use a wooden dowel. You can VERY easily see the fuel level on the dowel. Put it against the outside of the tank to give yourself a pretty accurate idea of how much fuel is left.
- 3.) Before fueling, make sure that you have several fuel absorbing pads or collars in readiness. Double, triple, quadruple check that you are opening a deck fill pipe labeled "Diesel" and not "Water." After you have the cap off, check again to make sure you have opened a deck fill pipe labeled "Diesel." Take the fuel hose from the dock attendant and before inserting the nozzle into the fill pipe make sure that it is labeled "Diesel."
- 4.) Wrap a fuel absorbent collar around the fuel nozzle and make sure that it is inserted into a deck fill pipe labeled "Diesel" before starting the fueling process. Start fueling. Great Harbours are equipped with relatively small 2" deck pipes. Hi-speed fuel nozzles will not work. You are going to fill your tank at a pretty sedate pace – but at least you don't have to do it very often! It may take the better part of 15 minutes to pump 100 gallons. Slower is better after all – less chance of a spill. I suggest staying right there and fueling the boat yourself. Control the speed of the fill by hand. Filling too fast will cause the fuel to come back up the deck fill pipe and spray on the deck and in the water. This is bad.
- 5.) While fueling, make sure you have an absorbent pad held under the fuel vent by you (your free hand) or a crewmember. Listen to the fuel going into the tank and if it starts sounding like it is coming up the tube, STOP FUELING and wait for it to settle – you are probably trying to fuel too quickly.
- 6.) When the tank gets full, you will hear a slight whistling noise from your overflow vent. STOP FUELING. The tank is full. Continue to hold the absorbent pads over the fill hole and the vent. A small quantity of fuel will probably burp out after a few seconds. If in doubt as to the fullness of the tank, go below and CAREFULLY check the fuel level on the dipstick as described above. When you unscrew the dipstick, there may be pressure (and fuel) coming out. Be ready to screw it back in quickly if this happens and have plenty of rags handy.

### III. Water System

#### A. Water Tanks

- 1.) You have two water tanks – port and starboard. The exception to this is if you have a watermaker and opted to have one of the tanks converted to fuel (generally the starboard tank.) The tanks are filled from deck pipes on each side of the boat. It is just as important when filling your water tanks to double, triple, quadruple check that you are adding water to a deck fill pipe labeled "Water."
- 2.) In the engine room, on the forward bulkhead you will see two green or blue valve handles. One controls water flow from your starboard tank and the other controls flow from the port. When either handle is in-line with its water line, it is in the "on" position. You must have at least one handle in the on position when your water pump breaker switch is on. You also have a water tank gauge on the same engine room forward bulkhead (or in the utility room on GH47s.) This gauge has a switch to indicate either port or starboard tank.
- 3.) If you leave both water tank valves open, when your sink or shower starts spitting air you will know you are COMPLETELY out of water. Not good – especially if you just anchored out for a nice relaxing night and are ready to cook dinner! A better solution is to start with only one tank valve open. Check the gauge daily and when it shows approximately half tank remaining, switch from this tank to the other. Then, when you run that tank dry, you can switch back to the other tank and will know that you have about one-half tank remaining. You will need to fill your tanks the next time you are tied to a dock.
- 4.) You probably have a freshwater washdown hose port on your foredeck somewhere. You also have a blue or black quick-connect for this outlet. Make sure all the springs and valves are out of the connector. They don't do much other than severely restrict the flow.
- 5.) A great tip is to buy a 6' length of garden hose from your local hardware store. These are typically sold for connecting a hose reel to a hose bib. The plastic "coil" type hoses also work great for this – but are a bit pricier. Whichever way you go, attach your quick connector to one end and an inexpensive spray nozzle to the other. Now you can wash down your anchor chain easily without dragging 50' of hose onto your foredeck! Leave it connected while underway offshore and you can use it to periodically hose the saltwater off your windshields.

- 6.) Many Great Harbour owners swear by the inexpensive electric power washers you can buy at Lowe's or Home Depot. They can be used for anything from washing down a muddy anchor to cleaning out your sea chest. They work great and use a lot less water than just flooding away with a hose.

## B. Water Pumps

- 1.) You will also see your stacked Jabsco fresh water pumps on the forward engine room bulkhead. The top one is a variable-speed pump and is your primary pump. The bottom, automatic backup is a single-speed unit. Both have screen filters to get the larger particles that may come from your tanks.
- 2.) To clean these filters, simply turn off your water pump breaker on the master 12-volt panel, unscrew (by hand) the clear plastic cover, pull out the screen hoop and rinse it out until clean. Replace the screen and screw the clear cover back on hand tight. To re-prime your water pump(s), turn the water pump 12-volt breaker back on and open the taps at your galley and bathroom sinks to bleed the air out of the system. Let run until there is no more air coming out. You must also bleed the air in this way anytime you run a water tank dry.
- 3.) When you clean the water pump filters, it is a good idea to also remove the aerators from all of your showerheads and sink faucets. Clean these well and you will probably see an immediate increase in apparent water pressure!
- 3.) Once in a while, we see the 12-volt water pump seem to stop working. If this happens, simply remove the fuses from the inline fuse holders by the water pumps and re-insert. If the pumps still do not start, tap the connections with a screwdriver handle. This usually is enough to get things moving again.

## C. Water Heater

- 1.) You have a 20-gallon hot water heater in your engine room. It is a 240-volt unit so only heats water when you are on generator or dockside power. However, the port side engine heat exchanger is also plumbed to the water heater, so when underway you are heating water even with the genset off.
- 2.) The temperature of the hot water is regulated by a thermostat near the end of the water heater. Make changes in small increments to avoid scalding someone the next time the shower is used!

## D. Watermaker

- 1.) While an in-depth discussion of watermaker maintenance and issues is beyond the scope of this manual (see HRO watermaker owner's manual for troubleshooting), we will discuss basic watermaker operation.
- 2.) You have either a 12-volt or 120-volt HRO 400gpd or 900gpd watermaker. The 120-volt watermaker cannot be run unless you are plugged into shorepower or running on generator power. The 12-volt system can be run at any time.
- 3.) The remote panel for the watermaker is located either at your helm (N-models) at your main electrical panel (GH37) or in the utility room (GH47). This panel mirrors the simple controls on the watermaker itself. First, make sure that the watermaker breaker on the main panel is "on." The yellow watermaker "Power" light should be on. Now push the soft "on" button on the remote watermaker panel or on the watermaker and the "System ON" yellow light should light.
- 4.) The watermaker should come on. If you have a 12-volt unit, that is all there is to it. Within about 60 seconds the "Safe Water" light should go green indicating that you are making potable water. If you have a 120-volt system, you will have to go down into the engine room after the green light comes on to adjust the pressure knob for the hourly watermaking capacity of your unit. The 400gpd unit should be set at about 16 (gph) and the 900gpd unit should be set at about 37. The top of the silver float is your indicator. Turning the knob clockwise will raise the float and counterclockwise will drop it. Never adjust the knob higher than your watermaker's rated capacity. A fault will result.
- 5.) If the "Safe Water" light does not go green or if your unit keeps tripping a fault, see the HRO manual for troubleshooting tips.
- 6.) The cleaner and less silty the water under your boat, the longer your filters will last. These units are optimum in a clean saltwater environment.

## IV. Head System

### A.) Head System Overview

- 1.) Your vacuflush head(s) use only fresh water to flush. These are relatively maintenance-free units that also are not anywhere near as sensitive as traditional marine heads. What this means, is that if it will fit through that one-inch hole at the bottom of the toilet, it WILL end up in the holding tank. Now, some of your boats have macerators, while the newest boats have diaphragm pumps to pump the waste tank overboard (only when at least three miles offshore, please.) If it has ended up in the holding tank, it may NOT necessarily come out through the macerator. This is especially true of feminine hygiene products. Please tell your guests this. Trust me, it is NO fun cleaning a clogged macerator (the diaphragm pumps are a bit slower than macerators – but they WILL pump most things through!)
- 2.) Somewhere on your boat (helm or head, usually) you will find a "TankTender" gauge with four lights. These lights indicate (usually) the relative fullness of the waste tank. When the red, "Full" light is on, you will not be able to flush your heads. It is time for a pumpout!
- 3.) What toilet papers are safe for your head system? Well, certainly avoid the "quilted" types – like Northern. Many of these have embedded nylon strands that will clog your TankTender sender – or worse. Buy any toilet paper that lists on the label "biodegradable" or "safe for septic tanks." One ply tissue dissolves faster than two-ply tissue, but buy two-ply if that is your choice. (A hint - if you fold one-ply it becomes two-ply.) If you want to test your favorite tissue to be sure it's safe, drop a square in a glass full of water and stir it vigorously. Wait about 20 minutes and stir vigorously again. If the tissue dissolves, it is safe to use in your boat's holding tank.

### B.) Pumping Out

- 1.) To pump overboard (again, only when offshore, please), simply turn on the 12-volt breaker labeled "Macerator." Then go down into the master stateroom, open the port side hanging locker and you will see a covered electrical switch (like a light switch). Flip this switch and you should hear your macerator/diaphragm pump start to work. Go immediately topside and watch off the port side of your boat for the stream of, uh, effluent. It may be a bit more palatable to go upwind and stand on the foredeck to watch. When the flow starts to slow down, immediately run down to the master stateroom and

flip that switch to the "off" position. Now go back to the 12-volt panel and turn off the "macerator" breaker.

- 2.) To use a marina dockside pumpout, first open the deck plate labeled "Waste." This is generally located on one side or the other of the windlass at the bow. Insert the marina's pumpout adapter hose into your open deck pipe. Turn on the vacuum lever on the pumpout nozzle and you should see the effluent leaving via the clear hose on the nozzle. When the flow stops, simply turn off the vacuum lever and remove the nozzle. Some marinas ask that you turn the vacuum back on and drop the hose nozzle overboard for a few seconds to let clean water pump through the hose. Some (typically those with a portable unit) don't want any extra water in their tank!
- 3.) If your marina's pumpout hose has a screw-in fitting, you may have to remove the wire cable that attaches your deck plate cap to your deck pipe. If you must do this, be very careful not to drop the deck plate cap overboard when opening!

### C.) Head Maintenance

- 1.) The only real maintenance on the SeaLand Vacuflush head involves occasionally removing the one-way "duckbills" from the head and the vacuum unit (in the engine room or below one of the aft alleyway hatches) and cleaning the calcium deposits off of them. This procedure is covered in detail in the SeaLand manual and I will not go into it here.
- 2.) If you go to flush your head and nothing really happens, chances are you have left your 12-volt "Head" breaker off. If not, then there is a chance that the solenoid on the vacuum unit is sticking. Go down to your engine room and locate the large white vacuum unit on the forward bulkhead. On the top of this unit will be a removable plastic cover sticking straight up. Remove this (by hand) and you will see a steel plunger rod and spring. Tap this gently a few times with a screwdriver handle. If this starts it working, turn off the breaker and lubricate this rod lightly with some lithium grease or WD-40.
- 3.) If your toilet does not hold water or if the vacuum pump continues to run on its own periodically, then you may have mineral or debris build-up at the bottom of the bowl between the large ball valve and the seal. To clean this out, first shut off your freshwater pump and head breakers. Then use the cleaning tool provided with the SeaLand kit or a thin wooden tongue depressor to clean between the ball valve and seat. Use either SeaLand's cleaning solution or a simple lubricating solution like Pam cooking spray.

- 4.) There is an EXCELLENT spares kit available for your SeaLand toilet system. Please contact Mirage for pricing and availability.

## V. Electrical System:

### A. Inverter Operation:

- 1.) Your 3000-watt Xantrex Freedom Marine 30 inverter is located in the engine room (or utility room on the GH47.) This is a modified sine wave inverter with built-in battery charger. When you are connected to shore power or running on the genset, your inverter is just "passing" power through – it is not actually doing any inverting. It is (generally) however, charging your main battery bank.
- 2.) The operation of the inverter is pretty transparent. However, because it is a modified sine wave inverter, it has a few idiosyncrasies. First, it seems to be particularly hard on coffeemakers. I don't know why. Second, it will probably cause the digital clock on your microwave to run a bit slow. Finally, it may cause some floating horizontal lines on your TV screens to appear. These lines are not usually bothersome. You may be able to minimize these problems by purchasing portable appliances (clock radios, etc.) with their own transformer or "brick." These appliances will last longer and – in the case of electric clocks – keep accurate time!
- 3.) You can control your inverter from the remote Xantrex panel at your helm (or near your power panel on GH-models.) This remote panel is very simple to use. The three horizontal lights on the left hand side serve two purposes. When you are plugged into shorepower or on generator, these simply indicate CHARGE STATE. Red is "bulk" charge, yellow is "accept" charge and green indicates "float" charge. When you first switch over to genset or shorepower, the charge indicator will go to red – even with completely charged batteries. If the charger senses that the batteries are fully charged, it will then go to yellow and shortly thereafter, to green. Obviously, if the batteries are less than full, it will charge at whatever rate needed in order to bring the battery bank to full charge.
- 4.) When NOT on shorepower or generator power, these lights indicate BATTERY STATE. Green being fully charged, yellow, getting low and red meaning that they need to be charged ASAP.
- 5.) There are three soft buttons at the bottom of this panel. The leftmost is the "Setup" button. The functions of this button can be found in your Xantrex manual and is beyond the scope of this manual. The next soft button is the "Charge" button. This button (when lit) indicates that there is 120V power coming into the charger and the charger is charging the batteries at the charge rate indicated by the previously discussed horizontal lights. The exact

charge rate is also indicated on the light scale above the "Charge" button. Pushing this button will turn off the charger (green light on button will go out). Pushing it again will turn the light back on. When the charge light is on, the lights above this button indicate charge voltage. When this light is out, the three horizontal lights and the light scale above the "Charge" button indicate battery bank voltage level.

- 6.) The third soft button is the "Invert" button. When lit, the inverter is available to run all inverted circuits. When you push this button and turn out the invert button light, you are still powering the inverted circuits as long as you are plugged into shorepower or on generator. The light scale above the invert button indicates how much amperage is being inverted. The more amperage being inverted, the faster the batteries are being drained.
- 7.) The rightmost button is the "Power Share" button. This button simply controls how much power the charger can appropriate to charge the battery bank. Pushing the button repeatedly scrolls through the indicator lights. Typically, you don't need anymore than 20 or 30 amps available to the charger, so that is where you should leave your Power Share level.
- 8.) When you are running on genset or shorepower, both the "charge" and "invert" button lights should be illuminated. When underway, even though your engine alternators are charging your battery bank, your "invert" button light will be lit, but not your "charge" button light.
- 9.) There are charge and invert soft button lights on the face of the inverter itself, however, one generally blinks and the other is solid. For example, when plugged into shorepower or on genset, the charge light will be solid and the invert light will blink. The charge light will blink and the invert light will be solid when 120v power is not available. Pushing either of these soft buttons will turn its light on or off.

## B. Batteries

- 1.) Your house battery bank is located in the engine room on the starboard side. There will be six or twelve 6-volt wet cell or AGM. These batteries are wired so that each pair of batteries equals the voltage and amperage output of a much heavier 8D size battery. These batteries power the inverted circuits and start both main engines.
- 2.) You also have a separate wet-cell or AGM 12-volt battery that is located over behind the generator and is solely used to start the generator. The logic here is that if your house bank is too low to start your main engines, starting your genset will quickly bring the battery bank voltage up enough to start the engines.

- 3.) The windlass and bow thruster are both 24-volt units. There are four six-volt AGM batteries located below the queen berth in the master stateroom to power these units. These batteries are maintenance-free, however, as with all battery banks, you should periodically check to see that all connections are tight and corrosion-free.
- 4.) When your Xantrex remote panel indicates that your battery bank voltage has dropped below 12.0 volts, you need to charge your battery bank ASAP. Either start your generator or plug into shorepower to bring your battery charge level up. Keeping your batteries in a state of discharge will shorten their lifespan dramatically – as will continual draining down to deep discharge before charging.
- 5.) AGM batteries require no maintenance and should last many years. The wet-cell batteries are simply deep-cycle golf cart batteries and do require periodic (monthly at least) filling with distilled water. These batteries typically don't last quite as long as the AGMs, but they can be purchased inexpensively almost anywhere.
- 6.) Typically, the standard six 6-volt wet-cell battery bank will run the refrigerator "overnight." So, if you are watching TV or cooking or reading or working on the computer at anchor in the evening, run your generator until it is time to turn the lights out and go to bed. In this way, you can be sure that your batteries will still be partially charged in the morning. You can then fire up the generator (or start the main engines) to bring the battery charge state back up. Of course, the optional twelve 6-volt AGMs will keep the refrigerator running for quite a bit longer.
- 7.) Regardless of whether you have wet-cells or AGMs, at least monthly, you should check ALL battery connections for tightness and to make sure that no corrosion is forming. Keep in mind that a loose connection with a lot of current running through it will be quite hot.
- 8.) If leaving your boat for an extended period of time without shorepower, it is advisable to remove and discard everything from your refrigerator, prop both doors open and turn off all breakers. This should keep from draining your batteries for several weeks.

### C. Shorepower

- 1.) Your 50-Amp shorepower receptacle is mounted on the outside of your boat – GH-models on the front of the pilothouse – and N-models between the front deck boxes. This may be mounted next to another receptacle for plugging in your cable TV.

- 2.) To connect to shorepower, first make sure that both the big generator and shorepower main breakers are in the down or off position. These breakers are located in the center of your main electrical panel and have a slide to keep from engaging both these breakers at the same time.
- 3.) Next get your 50-amp yellow shorepower cord out and plug the female end (with the screw ring) into your boat receptacle. This takes some strength and practice to get this heavy plug to go in (you may have to rotate it around to line it up properly.) Once plugged all the way in, give it an eighth-turn clockwise to lock it in. Then you must ALWAYS screw the ring collar onto the threaded receptacle! If you do not, there is a chance of short circuit and fire.
- 4.) Take the other end of the shorepower cord and drag it onto the dock to plug into a 50-amp outlet. First make sure that outlet breaker (on the dock power box) is in the "off" position. Plug in the cord and give it a quarter turn to lock. Turn the breaker on the dock power box on now.
- 5.) Go back onto the boat and lift the big shorepower breaker up to the "on" position. Make sure that your amperage gauge (on the main electrical panel) is reading around 110-120 volts. You are now on shorepower.
- 6.) To remove the shorepower cord, reverse the above instructions. Always close the chrome shorepower receptacle cover and screw it on to prevent salt water from corroding the inside of this plug. For the same reason, stow your shorepower cord safely away (generally in one of the front deck dock boxes.)
- 7.) In the event that there is only 30-amp power at your dock, you can buy and use a "Smart Y" adapter to adapt your 50-amp shorepower cord to two 30-amp dock outlets. Caution, even though this will work, you will only have a total of 30 amps available to you instead of the normal 50. Some power conservation will be in order!

#### D. Generator

- 1.) Your 8 kW or 13 kW MasPower generator is located in a hush box inside your engine room. There is a remote start panel for your generator located near the helm (N-models) at the main breaker panel (GH37) or in the utility room (GH47).
- 2.) To start your generator, first make sure that your generator main breaker (in the center of the main electrical panel) is in the down "off" position. Then simply click the generator start button to the "Pre-heat Start" position. In about 20 seconds, the generator should automatically start. A green light indicates a properly running generator. The red "alarm" light indicates a fault and/or

that the generator has stalled. Once running, give the generator a minute or two to stabilize and then flip the generator main breaker to the up "on" position. You should see the line voltage indicator on the main panel come up to 110-120 volts. You are now on generator power.

- 3.) To turn off the generator, first flip the main generator breaker to the down "off" position. Let the unit run unloaded for a minute or two to cool down, then click the generator start button over to the "Stop" position.
- 4.) You can also turn your generator off and on with the panel mounted on the genset hush box. Simply push the yellow soft touch button with the picture of a hand. In twenty seconds or so, the generator should start up. Pushing the red button with an "o" on it will turn off the generator. In fact, the remote start panel will only control the generator when the "auto" button light is on. Push this soft button to turn the auto function on or off.
- 5.) In the event of a red light fault, or if the generator starts and stalls, you will have to go down to the generator panel and reset it. Pushing the red "o" button several times should clear the fault lights. Then push the "auto" button to light it up. You can now retry starting the generator at the remote panel.
- 6.) If after several resets, the generator still will not stay running, consult the owner's manual for troubleshooting based on the fault lights that you are seeing on the generator panel.
- 7.) Keep in mind that running the generator for long periods of time with little or no load is bad for its longevity. When running your generator, you should usually be running your air conditioning and or stovetop or have your watermaker operating to keep a load on it.

## E. Electrical Panel Operation

- 1.) Your main electrical breaker panel is divided into three sections. The top section controls the 12-volt circuits (although GH-models have an additional 12-volt panel at the helm for pilothouse 12-volt accessories), the middle section controls 120-volt circuits and the bottom panel controls 240-volt circuits. The 120-volt section is further divided into inverted and non-inverted circuits. Circuit breakers with red surrounds are inverted circuits and (like the 12-volt circuits) can function even when not plugged into shorepower or on generator.
- 2.) A good rule of thumb is to leave the circuit breakers in the on position for any circuit or appliance that has its own on-off button. Circuit breakers that should be turned off when leaving the boat for extended periods include head, shower sump and water pressure

(unless you have a watermaker – in which case water pressure must be left on for periodic automatic freshwater flushes.)

- 3.) Your 12-volt panel has two gauges (digital or analog). One shows voltage coming from the batteries and the other shows the amperage draw. There is a 4-position rotary switch under and between these gauges. Position one indicates house bank voltage and draw. Position two (sometimes four) indicates forward (bow thruster/windlass) battery voltage and draw. Keep in mind that position two is a 24-volt system. The other positions on this switch are not used.
- 4.) Your 120-volt panel gauges also indicate voltage and amperage draw. However, in this case, the "Test" switch below and between them simply switches back and forth between the left (Bus A) and right (Bus B) "leg" of 120-volt breakers. The "Start/Stop" and "PreHeat" switches on the master breaker panel are not used.

## F. Other Electrical

- 1.) There are four switches (usually protected by a metal guard bar) on your helm. These are the master power disconnects for your thruster, windlass, main battery bank, and engine power. These should generally be left in the "on" position at all times (with the exception of the windlass perhaps).
- 2.) There are other switches on the helm to control the on/off and functions of the windshield wipers, spreader lights, horn, running lights/anchor lights and windlass.
- 3.) Your bow thruster is turned on by pushing and holding the button on the joystick panel and then pushing the joystick to the right (or left – depends on the installation) for a few seconds until you hear a beep and the little green light on the thruster button goes on. Doing exactly the same thing again will turn off the thruster (with a double, long beep). Caution, if your thruster master disconnect switch is in the "off" position, the thruster will not function, even though the light will light and the unit will beep. If you turn on the thruster and fail to turn it off, it will make a double beep after about 10 minutes of non-use. If you continue to ignore it, it will make another double beep about 10 seconds later and turn itself off. At any time, you can reset the 10-minute timer by engaging the thruster for a few seconds.
- 4.) Fifty amps is not enough to run absolutely EVERYTHING on the boat. You can pop circuit breakers while on shorepower or on genset by loading too much at a time. For example, running both (or all three) air conditioners, all the burners on the cooktop, watermaker and a hair dryer all at the same time is pretty much a sure-fire way to pop a circuit breaker. You still need to implement a

little bit of power management. Use common sense. When running on genset, as you turn on new appliances, check to make sure you are not overloading a "leg." Your genset can only supply 33.33 amps per leg. With different 120V appliances on different legs and 240V appliances drawing from both legs, you may need to exercise some power management so as not to exceed the available amperage on either leg. Check the leg amperage with the toggle switch as described earlier.

- 5.) By the way, there is a main breaker located under the control panel on the side of the genset hush box. This should be checked if you are running on generator and suddenly lose 120V power while the generator continues to run. The up position is "on" for this breaker.
- 6.) On this same subject, when leaving the boat for dinner at night, don't leave every light in the boat on. First of all, those 12-volt halogen bulbs are expensive and secondly, this is not good power management – especially if you are leaving the boat at anchor with the genset off! If you must, leave one saloon reading lamp on (and, of course, your anchor light.)

## VI. Other Systems

### A. Ground Tackle:

- 1.) Let me start off by saying that the Maxwell electric windlass and all-chain rode makes anchoring a pleasure. However, this is probably the most dangerous piece of equipment on your boat and you must be absolutely careful and vigilant when using it. Don't allow guests to do your anchoring and NEVER let children near the windlass when it is being used – or when the windlass power is "on." This is why it is a good idea to leave your windlass master switch in the "off" position unless you are going to use it imminently. Another safety measure is to never put your fingers anywhere near the chain gypsies when you are operating the windlass. And when you are messing with chain stops and locking pawls make sure to keep your feet clear of the deck buttons so that you do not inadvertently start the windlass with your fingers near it!
- 2.) To make sure your windlass is going to drop the correct anchor, you must use your clutch-tightening lever to tighten the clutch on the side of the anchor you generally use and leave the other side loosened. There are two locking pawls on the front of the windlass. These should be left in the up (locked) position and both anchor chain stops should be engaged on their respective chains. This assures that you will not accidentally deploy an anchor in a seaway.
- 3.) When approaching an anchorage, check that your windlass master switch is in the "on" position. Then decide first which anchor you will be deploying. Don't forget to drop the locking pawl on the

anchor you will be using! Great Harbour owners use their starboard Delta plow anchors 90% of the time. This anchor works great in most conditions. The only exception might be the gumbo mud you find in some areas of the Chesapeake. For the sake of the following examples, we will assume that the Delta is the anchor that you have the clutch tightened on.

- 4.) Some Great Harbour owners like to put all kinds of keepers and strings or cables on their chain stop pins and plates. That's fine, but I find it makes pulling the pins and getting things out of the way a bit tougher. Here is what I do: As we approach the anchorage, I pull the Delta's anchor chain aft slightly to disengage the chain from the chain stop. I rotate the plate up out of the way and let go of the chain. Now I CAREFULLY pull the locking pin while holding the plate. With both the plate and the pin in my hands, I walk them back to the deck boxes and carefully set them there so there is no danger of me kicking them overboard during anchoring.
- 5.) When the boat is over the spot where I intend to drop anchor, I make sure all is clear and start deploying the anchor chain with the electric foot pedal next to the windlass. I ALWAYS deploy the anchor while standing on the bow – not at the helm and not on the flybridge. I want to be sure that the chain is deploying smoothly and safely. Let's say I am anchoring in 5' of water and the forecast is for a calm night. My bow is about 7' off the water (N-model), so I decide to deploy about 75' of chain (approximately 6:1). There is no point in just reeling the chain off and piling it up on top of the anchor on the bottom! So, assuming there is at least a little bit of current or breeze, I let the boat drift back and deploy my anchor chain slowly as I go. When I get to 75', I stop deploying chain and wait for it to come up fairly tight. Now I walk back to the deck box, CAREFULLY pick up my pin and lock plate, walk them back to the bow and insert the pin through the holder and plate. Generally, you can give the chain a little tug and lock it under the plate. 90% of the time, that's it. The anchor is now set.
- 6.) If there is not much wind or current pushing me back, I might want to use the engines to set the anchor a little better. I go back to the helm and put both engines into reverse. As the anchor chain starts to come up tight, I give a little throttle to both engines – I DON'T try to rip the anchor out of the bottom by slamming the engines into full astern. There is no point to that. It is just REALLY hard on your ground tackle. If you have the engines in reverse and a little bit of throttle – and the boat is not moving – your anchor is set! If there is forecast for high winds or you are nervous about the anchorage, put some more scope out.
- 7.) When I am leaving an anchorage, I make sure my engines are started and then I walk to the bow to retrieve the anchor. If there is a lot of wind, I might have someone at the helm bumping the engines into forward to help me retrieve chain. The windlass is not

designed to "winch" you forward to your anchor. If you are retrieving chain with the windlass and you hear it start to slow down or labor, stop retrieving and wait for the boat to move over the chain a little more. Otherwise, you might overheat the windlass and trip its circuit breaker (mounted on the forward engine room bulkhead – or on the starboard side of the mast bed on older boats.)

- 8.) With light winds, you generally can use the momentum of the boat and the weight of the chain to help the windlass retrieve. Here is what I do: Start by pulling back slightly on the chain to release the chain stop. Flip it up out of the way, remove it and set it back on the deck box out of the way. Step on the deck button to start retrieving chain. As soon as you hear the windlass start to labor just a bit, stop. The boat will have started forward towards the anchor and the momentum will allow some slack in the chain. When the boat has moved over the chain so that it is about straight down, start retrieving chain again. Repeat this process until the anchor comes up out of the water.
- 9.) Bring the anchor quickly up into its chute (don't bring it tight against the stops though!) Go back to the helm to leave your anchorage safely. When you are safely away, or if you have help at the helm, you can go about the task of replacing the lock plate and pin. Do not think that you have to have the anchor all the way up tight against the chute with the lock plate locked. A little bit of slack will not cause a problem – and will make it much easier to pull the lock plate the next time you go to anchor! If you are using the windlass to "bump" the anchor up into position, you might find better control by using your heel against the deck button rather than your toe.
- 10.) Finally, a note about chain snubbers: Many Great Harbour owners love to use these and have designed and installed elaborate systems to take the stress off their windlass and chain plates. If you like a chain snubber, use one. An inquiry on the Great Harbour Forum will likely generate multiple systems that are the "best" way to snub an anchor. However, a simple running hitch of three-strand nylon on the chain and then bridled to your bow cleats may be the most efficient and simplest of all systems.

#### B. Mathers Electronic Controls (optional):

- 1.) To activate your electronic controls, first flip on the "engine controls" breaker on your 12-volt panel. You should hear the controller start to beep loudly at you. Make sure the levers are in the neutral position and push the black button on the back of the controller until the beeping stops. You should have solid red lights on top of your controller binnacle now telling you that these controls are active. The engines can now be started.

- 2.) In order to switch from one control station to another, simply go to the station that you wish to drive from, make sure the levers are in the neutral position and push the black button until the red lights come on – informing you that the control is now at your station.
- 3.) If the boat is underway when you do this – for example, let's say we have been running from the pilothouse helm and are at cruising speed. We now wish to go up to the flybridge to run the boat. We do NOT have to slow the boat down or put the lower controls in neutral. Simply going up to the flybridge and pushing the button on the back of the controls will bring the engines down to neutral and switch control to that station. Now you can put the levers back into gear and accelerate up to cruise speed.
- 4.) If you decide to come back down to the lower helm and take over there, you only have to put those levers back into neutral before pushing the button. Also, if you are going up on the flybridge on a nice day to con the boat, you don't HAVE to immediately activate the upper engine controls. If you are cruising along and have to take evasive action or slow down the engines, remember that pushing the button will immediately bring the engines to neutral and idle.
- 5.) You can rev the engines in neutral or idle up for cold weather starts. Flip on the main "engine controls" breaker and push the button on the binnacle to engage that set of controls (and stop the beeping!) Now push the button again and hold it while putting the port control lever in forward gear. The portside red light starts to blink and when you start your port engine, pushing forward on the lever will cause the revs to increase, but the transmission will stay in neutral. You can repeat for the other engine. Pulling the throttle lever back to the neutral position will cancel this feature and the controls will be back in the normal ready position.
- 6.) There is an automatic engine synchronizer built into your controls which is transparent in use. As long as the levers are within ten percent of each other, the engines will automatically synch. The green light coming on intermittently on top of the control binnacle is your only indication that this feature is active (that – and the fact that the engines are always synchronized perfectly!) When maneuvering at the dock, the controls are more than ten percent apart so the synchronizer is not engaged and does not affect the ability to use differential throttle at the dock. To turn off the engine synchronizer feature temporarily, push the button on the binnacle for about 8 seconds and you will hear a change in engine pitch on one of the engines as the synchronizer shuts off. You can turn it back on by repeating these steps. Also, if you shut off your electronic controls, the next time you activate them, the synch feature will be active.

- 7.) You also have a feature called "single-lever" control. This feature allows you to control both engines with one lever. This is useful when traveling the Intracoastal or anywhere that you are constantly going up and down on engine rpms to accept a slow pass or to slow down for marina or manatee zones. To turn this feature on, you should be underway. Make sure both controls are in forward at the first detent position. Then push the button on the binnacle and hold it while pushing one throttle forward. Let go of the button. This is now your "live" control lever. It controls the speed of both engines. You can push the other lever all the way forward to get it out of the way and avoid confusion. Pulling both levers back to neutral cancels this feature and puts both levers back to normal operation.

## DIESEL ENGINE MAINTENANCE PARTS

	Generator		Main Engines	
	MP8M (8KW)	MP13M (13KW)	4JH4E (54hp)	4JH4-TE (75hp)
<b>Fuel Filter</b>	124550-55700	129470-55702	129470-55702	121850-42280
<b>Oil Filter</b>	119305-35151	129150-35152 or -35151	129150-35152 or -35151	119005-35100
<b>Main Belt</b>	25157-003500	25132-004440	25152-004300	121850-42280
<b>Water Pump Belt</b>	NA	104214-42780	NA	NA
<b>Water Pump Impeller</b>	18653-0001	128296-42070	129670-42530	127610-42200-01
<b>Impeller Gasket</b>		124223-42110	X0506590-01	24341-000700
<b>Air Filter</b>	2SE1	124770-12540		
<b>Thermostat</b>	129350-49800	129470-49801		
<b>Thermostat Housing Gasket</b>	129350-49541	129470-49810		
<b>Relay</b>	73994	73994		
<b>Glow Plug</b>	129795-77800			

## **Dockside Handling with a Great Harbour Trawler**

In this manual, we are going to talk a little about some of the techniques and tools that are specific to the hull, engine and rudder design of Great Harbour trawlers. This is not an attempt to teach anyone to dock a boat. Those of you with single-engine trawler experience will probably relate to the sections on using the rudder and bow thruster. Sportfish and other planing hull, twin-engine boat handlers should have a firm grasp on the differential throttle techniques. The trick is using all of these tools to make your life easier and safer.

We will also not go into advanced linehandling techniques, like using spring lines to help in docking. In fact, we're not going to talk much at all about lines. To learn about linehandling techniques and general dock handling techniques, there are several excellent books already on the market. We are also not going to talk much about fenders or dockside safety. Again, not really the goal here.

We are simply going to cover some techniques that will make handling your Great Harbour trawler at dockside easier and more trouble free. We are also going to assume that you have a bow thruster – since most of you have one. Although most of these techniques will work equally well without a thruster, having one sure makes docking simpler in windy or high-current conditions.

Here comes the **Legal Disclaimer**; the use of common sense and sound seamanship are assumed here. As captain, you are responsible for your boat and the safety of yourself and those around you. If an exercise or maneuver strikes you as unsafe or unwise for the conditions, don't do it! Don't get so caught up in the maneuver or exercise that you ignore what is happening around you. We have tried all of these techniques – and all of them take practice. Many also require you to anticipate what is going to happen as you adjust throttles, rudders or thruster. In other words, often, by the time the boat starts to do what you want, its time to stop whatever you did to initiate the action - time to take off throttle or center line the rudder or whatever. That's a learned skill.

### **BASIC GREAT HARBOUR BOAT HANDLING:**

Great Harbour trawlers are highly maneuverable – the product of wide-set twin screws and, for most of you, bow thrusters. All boats have their strengths and weaknesses and are subject to windage. It's better to learn the idiosyncrasies of your Great Harbour before you have a real, immediate need to know them or before some dockside "expert" tries to convince you that the boats are top-heavy behemoths rendered helpless by too much windage. It's just a matter of getting a good feel for the specific maneuvering characteristics of your boat.

There are three different ways to turn a Great Harbour. First would be using the steering wheel to turn the rudders, second is engaging the bow thruster and the third way is by using differential throttle.

## **Rudders**

Let's talk a little bit about the rudders: Obviously, if you are moving forward, turning the wheel to port makes the boat head off to port. But if you think about it, all that is really happening is that water flowing past the rudders is forcing the stern of the boat to STARBOARD. This points the bow to port and off we go to port. We have "turned" to port.

In effect, the rudders force the boat to pivot on a point somewhere close to the bow of the boat. This is a very useful fact to know: Turning the wheel hard to port forces the stern of the boat to move to starboard (and vice-versa). So, if we need to move our stern IN towards the dock (on a starboard side tie), we need to have our helm turned hard AWAY from the dock – to port.

The only caveat here is that we have to have some water flowing past at least one of our rudders to make this work. So at least one of our engines must be in forward gear. Doesn't matter which one. And having the other engine in reverse or neutral pushes hardly any water flow past that particular rudder – so it does NOT cancel out the stern movement. More on this later. In the meantime, suffice to say that if you are turned hard to port and at least one engine is in forward gear, the stern will try to move to starboard. So, using the rudders at dockside controls the STERN of the boat. But how does one control the bow?

## **Bow Thruster**

Well, the simple answer is by using the bow thruster – assuming you have one. With the boat moving slowly or stopped, hitting the bow thruster will force the bow to one side or the other (fairly dramatically in the case of our 24-volt MaxPower thruster.) Our pivot point is all the way at the stern of the boat. Simple. And the bow thruster doesn't care which engine is in forward or reverse or whether both engines are out of gear. Pushing that little joystick to starboard is going to push the bow to starboard.

One caution: In windy or high current conditions, nothing gives you more peace of mind than knowing that you have a bow thruster. But keep in mind that it really only controls the bow. Also, it is an unfortunate fact that you typically find out your bow thruster has failed or blown a fuse when you try to use it and need it most! So we need another way to control the bow of the boat at dockside.

## **Differential Throttle**

Most of what we have discussed so far applies to any displacement boat with a large rudder or rudders and a bow thruster. But the beauty of a Great Harbour trawler is that you have a third way to control the attitude of the boat – and that is with the engine controls. What we typically refer to as "differential throttle."

Our throttles and clutches (transmission controls) are combined on a single lever for each engine. This is unlike the typical twin-engine, four-lever set-up used on most high horsepower

applications. The reason for this is simple: Since we have very little horsepower pushing very big diameter props with not much pitch, we have hardly any thrust developing at idle engine speed. On a twin-engine boat with huge diesels, just bumping the engines in and out of gear is all you need to move the boat around. You typically dock these types of boats in neutral – just using the clutches to bump in and out of gear to affect the placement of the boat. You would hardly ever use the throttles at the dock. Some big sportfish boats IDLE in gear at over 7 knots!

With the little diesels in a Great Harbour, you need to be able to not only put the engines into and out of gear while docking, you also need to be able to add some power (throttle) to move these big heavy hulls around. You could do it with four levers – but when you combine that with steering and bow thruster... Well, it gets pretty complicated pretty fast and in the heat of a difficult docking situation, you might end up throwing a clutch into reverse when you meant to chop a throttle! So, we use the vastly simpler clutch/throttle single-lever controls.

The beauty of any twin-engine set-up is that you can pivot the boat in place on its own centerline. In other words, using differential throttle will allow you to "twist" the boat with the pivot point right near the center of the boat's length.

So what is "differential throttle"? Well, it is simply using those two levers like on a bulldozer, tank or one of those new lever-steered riding lawnmowers. With the mower (boat) sitting still, pushing forward on the left lever and pulling back on the right lever causes the mower (boat) to twist to starboard. The trick here is trying to remember how these levers control the attitude of the boat – and how much throttle to use on which lever to control fore and aft movement.

Here's an easy way to get an idea how these levers function. We're going to exaggerate the movements here for clarity. Stand facing forward and make two fists like you are holding on to the throttle levers. Push your left arm way out in front of you (forward gear) and pull your right arm way back past your chest (reverse). You should now be facing to the right. That's the direction your boat wants to turn.

Okay, so now we know that we can control the stern by pivoting the boat on its bow with the rudders. We know how to control the bow by pivoting the boat on its stern with the thruster. And, with differential throttle, we can control bow AND/OR stern by pivoting the boat on its centerline.

Next, we are going to try to some open-water exercises to really give you a feel for how the controls move the boat around. Finally, we will put everything you have learned and practiced to use in some typical docking situations.

## **EXERCISES:**

To help you get to know your boat and to learn some of the really neat characteristics of them, we invite you to try the following exercises. These are fun boats and the exercises are fun to do.

### **CAUTIONARY NOTES:**

Some exercises are intentionally designed to demonstrate certain maneuvers that do not work on a Great Harbour. Better you try them as an exercise in open water than when you are hard pressed to get to a dock or avoid another boat. So, when we suggest you pick a calm day and have plenty of maneuvering room, we mean it.

These exercises can be done over a period of time in pretty much any order as conditions permit. However, boaters who have experience with other types of boats, (particularly single-screw sailboats) should review these exercises and carefully read the docking procedures we have outlined elsewhere in this manual before engaging in serious maneuvers.

What works quite well with sailboats or planing powerboats can be counterproductive with a Great Harbour trawler. Look to see if what we describe as an effective maneuvering technique is different from what you have been doing. We have seen new owners do what seems to be a strange thing with their Great Harbour because it was what they did with their old boat. Your new boat is simply different in ways you need to get used to.

Most exercises are best done in proximity to a dock or something that can provide a fixed visual reference. Another important point is to "debrief" after you get through with your exercises for the day. Spend some time and really try to answer the questions posed with the exercises.

### **STEERING:**

As you saw in the notes above, there's a lot more to steering than just turning the rudder to port or starboard.

1. Get a feel for turning radius by doing a maximum rudder angle U-turn at low speed, medium speed and high speed. You can visually estimate your turn in boat length units or you can use navigation tracking software to record your turns for precise measurement.
  - a. Estimated turning diameter – low speed:
  - b. Estimated turning diameter – medium speed:
  - c. Estimated turning diameter – high speed:

2. Reduce turning radius by:
  - a. Accelerating the engine to the outside of the turn (example - more starboard engine for port turn) to drive the bow around. How much does this cut the radius? How much does this speed up the turn rate and the boat?
  - b. Reverse the engine on the inside of the turn (example – reverse idle or reverse 1/3 the port engine in a port turn). How much does this reduce the radius? How much does this action speed up or slow down the rate of turn?
  - c. Use bow thruster to push the bow in the direction of the turn. How does this action affect your turn?
3. What happens when you turn going forward? These boats have a forward pivot point, so do several turns to identify just where the pivot point is on your boat. We could tell you, but it is much better for you to see for yourself. How much does your boat appear to slide or slip as you turn? At what speed? How much does your stern kick out when turning? Having an accurate feel for this kick is important when leaving a dock or maneuvering in tight spots.
4. Steering with bow thruster: Practice steering with your bow thruster so you are prepared when you are in a tight spot and cannot afford to have your stern kick out in a turn. Where is your pivot point when you use your thruster to turn?
5. You cannot use your rudders for steering while backing. Try this exercise to see why: On a calm day with ample maneuvering room, back with rudders centered and then turn either way to max rudder angle. If the boat does not turn, gradually accelerate until the rudder takes effect. What happened when it took effect?
6. How to steer in reverse – rudders center lined:
  - a. With throttles – Drag back on throttle to the side you want the bow to move to and to the opposite side you want your stern to move to. Accelerating the starboard throttle will pull the bow to starboard and push the stern to port. Which effect is more noticeable, bow pulling over or stern pushed over? The answer is important to know if you ever have to back down a narrow fairway.
  - b. With bow thruster: Try this several times and observe where your pivot point is and how much your bow has swing to achieve the desired course change.

## **TWISTING:**

Twisting means using differential throttle to pivot the boat either stationary or while the boat is moving. Great Harbour boats can just about pivot 360 degrees within a one-boat length circle – with practice. So let's set up some preliminary exercises for you to practice.

Note: it is far better to practice with minimal throttle at first and then increase throttle as necessary or as you get a feel for the throttle effects. A propeller in forward gear is more efficient than in reverse so heavy use of throttles can produce undesired complications that will affect your perception of what works.

1. On calm, preferably slack, water, with little wind to influence your maneuvers and with the rudders centered, oppose engines at 1/3 throttle. It doesn't matter which is forward and which is reverse. When the rate of turn seems apparent, increase throttles to forward 2/3 and reverse 2/3. Then turn your rudder in the direction that the bow is swinging so if your bow is swinging to port turn as you would to initiate a port turn. When this new rate of turn is apparent, use your bow thruster to accelerate your rate of turn. What has happened to your rate of turn with each change?
2. Repeat this procedure a couple times to get a good feel for what is happening. You will be using variations of these twisting controls constantly.
3. Now let's put twisting to practical use. With plenty of maneuvering room, pick a spot to head towards after pivoting the boat at least 180 degrees. Pivot and head to that spot, two ways. First, bring the boat around and stop or almost stop the rate of turn heading directly at your desired direction before accelerating. Second, accelerate forward somewhat aggressively before you are pointed at your desired point. In this case, you would expect the forward motion and normal turn of the boat to complete the pivot. What is the practical difference in these two maneuvers? Is the arc created in the second part of the exercise wide enough to get your boat in trouble? If so, remember to completely turn to your intended heading before accelerating.

## **WIND & WINDAGE:**

GH-models and, to a lesser extent, N-models look like they have much more windage than other boats. The reality is that they don't. All boats have windage. Good boat handlers learn how to deal with and take advantage of windage. The following exercises are to be done on a moderately windy day. One that has enough wind for you to expect your boat handling to be affected but not one that makes your return to the dock too challenging.

When maneuvering at low speeds in strong winds, the wind could very well take the boat in an entirely different direction than you intended. If it is that strong, go with the flow, adjust, get the boat safely under control and go from there. It helps to have a sense of what to expect, so work on the following:

- 1.) When headed slightly away from the wind, start a full turn first turning down wind and then up into the wind. At what point does the wind clearly inhibit your turn? Did you need to do anything to complete the turn? What?
- 2.) Keeping the boat head into the wind is important for anchoring. Keeping it into the wind and on station is important when waiting for bridge openings in restricted waters. Maneuver the boat head into the wind at minimal speed and practice keeping the boat headed into the wind using only differential throttle. (You may want to be conservative with the amount of wind you expose yourself to at first.) When you become proficient at holding the boat into the wind with minimal forward motion, start working at keeping it from

moving forward or aft. When you are able to do this, are you experiencing any other motion?

- 3.) Pick an open dock up-wind and practice approaching the dock. This is not a touch and go exercise, we just want you to come into the dock as you would to dock but only get close and then decelerate. How much momentum do you have when you decelerate? Approach several times decelerating, then come in and put engines in neutral to see what the wind does with the boat. So what does the wind do to the boat?
- 4.) If you have been coming in at an angle to the dock to complete exercise 3 and if the wind allows you, now approach the dock dead up wind to T-bone the dock. Slow and then stop. How is this different? Can you use your station keeping, head-into-the-wind skills at this point?
- 5.) If you ever have the clear opportunity to back from a wind protected spot into wind with plenty of maneuvering room, try it to see what happens. Sooner or later, you will have no choice. Expect for the wind to swing your boat around like a barn door when it catches your hull. You can plan for and allow for this movement if you are prepared.

## **DOCKING TECHNIQUES:**

*NOTE: The 90-degree "T-Bone" approach that is outline below in the section on docking into the wind can be used comfortably in most wind or current conditions. For many of our owners, it is very much THE all-around dock approach with a Great Harbour trawler. Especially with a GH-model, this approach will allow you to slowly pivot the boat alongside the dock. In most conditions, if you can get a bow line onto the dock from a T-Bone approach, you will be able to bring in the stern. The exception here is when you have a fairly strong current or wind parallel to the dock. In this case, obviously, presenting a side profile to the wind or current as you go to 90-degrees is going to set you right into the boat docked ahead or behind. In that case, the 45-degree approach is a safer method. Your best bet is to learn and practice multiple docking techniques so you are prepared for any docking/wind/current scenario.*

## **ALONGSIDE DOCKING:**

Due to the wide beam of the Great Harbour trawlers, much of the time you will be docked side-to on a tee or face dock. Although many of us prefer the simplicity of coming alongside to having to back into an unfamiliar slip, certainly, docking to or leaving from a face dock presents its own set of challenges.

Let's assume for all the following examples, that you are docked (or docking) starboard side to the pier with boats fore and aft of you. In other words, you are not going to have the luxury of cruising along a deserted dock for a hundred yards until you get close enough to throw a line

to someone! For that kind of docking scenario, you will need to go over to Six Mile Creek and dock at the Outback Crab Shack during a typical weekday!

As I said, you are going to be assuming a starboard side tie up for all the following examples. One reason for this is that this is the preferred side for N-model Great Harbours since the starboard helm door allows the single-handed or short-handed captain to assist in the linehandling dockside. For docking or undocking with port side to the pier, you obviously simply reverse the rudder/throttle/thruster instructions.

Another thing to keep in mind: **DON'T BE IN A RUSH!** It is a good idea to periodically put both engines into neutral for a second during the docking procedure to see which way the boat is moving. This helps you determine if the boat is moving at the speed and in the direction desired, or if you have to counter either speed or direction to get where you want to be. This will also keep you from making a bad situation worse.

### **Leaving the dock in relatively calm conditions**

Before instructing your crew to cast off all lines, take a few seconds to get your controls in order. Engines should obviously be started and in neutral. Your bow thruster should be armed and ready (master switch on and thruster control turned on). By the way, it is a real good habit to test the thruster for a second in each direction just to be sure it is ready. This especially applies when coming IN to a dock. Now you are ready to cast off.

- 1.) Since you are leaving a starboard tie dock – and want the stern to go away from the dock – turn the helm hard to starboard (towards the dock).
- 2.) Once the boat is untied from the dock, put the starboard engine in forward and the port engine in reverse.
- 3.) Start adding power to both engines. This has the effect of trying to twist the boat to port. So the bow is going to come out. Normally the stern would also try to move in towards the dock, but remember, you have your helm hard over to starboard and you have water flowing past the starboard rudder (since that engine is in forward). This, again forces the stern out. So your bow is coming out and your stern is coming out. The boat is moving sideways – without the thruster!
- 4.) The only real trick here is in adjusting how much **THROTTLE** you are giving each engine to keep the boat from moving forward or astern during this maneuver. Keep in mind that the props are much more efficient in forward than in reverse – so you will probably need a bit more astern throttle on the port engine.
- 5.) Once away from and clear of the dock (and other boats), bring the steering back to center, put both engines in forward and drive away from the dock making sure that wind or current is not going to set you into another boat or obstacle. This technique will obviously also work very well with a wind pushing you away from the dock.

## **Leaving the dock with wind holding you against the dock**

This is a little bit trickier. You can try it with the same techniques as above, helm hard to starboard, starboard engine in forward and port engine in reverse. However, in even a moderate wind, you are just not going to be able to generate enough thrust to get the stern away from the dock working against your engines trying to generate a twist to port. So, you are going to reverse the differential throttle and employ your bow thruster.

- 1.) As before, put the helm hard to starboard – towards the dock.
- 2.) Now put your *port* engine into forward and your starboard engine into reverse. This has the effect of really forcing the stern away from the dock hard – which is what you want. Of course, it also really forces the bow TOWARDS the dock hard – which you DON'T want.
- 3.) So, to counteract this, use judicious bursts of port bow thruster. In this way the boat will sort of "crab" away from the dock – stern – bow – stern – bow.
- 4.) You will probably want to bring your bow out more than your stern so that you are lined up to power away.
- 5.) When you are far enough away from the dock and clear of the dock and other boats, bring the steering back to center, put both engines in forward and drive away from the dock making sure that wind or current is not going to set you into another boat or obstacle. Keep in mind that you are going to have to pay a lot more attention to making sure you don't get set right back into the dock – or another boat.

## **Docking alongside in relatively calm conditions (wind & current slack)**

- 1.) Approach the dock (on the starboard side), aiming the bow at the forward end of your space and coming in at about a 45-degree angle.
- 2.) Control your speed by bumping the engines in and out of gear (forward and or reverse).
- 3.) As the bow gets close to the dock, start to steer to port. Remember, since you are pivoting at the bow with your rudders, the effect of this move is to bring the stern towards the dock.
- 4.) Ideally, you will have timed this so that you just have to put both engines into reverse as you come alongside and stop exactly where you want to tie up.
- 5.) If not, use your throttles to control which end of the boat gets closer to the dock.

- 6.) As long as the helm is turned hard to port, the effect of adding forward power to EITHER engine will be to bring in the stern. So, if you also want to bring in the bow, you will have the port engine in forward and the starboard engine in reverse. If your bow is getting too close, simply reverse this. In other words, putting the starboard engine in forward and the port engine in reverse will push the bow OUT just a bit while bringing the stern in.
- 7.) Once the stern is where you want it, a short burst of starboard bow thruster will bring the bow up against the dock nicely.
- 8.) In light wind and current conditions, you should be able to walk the boat sideways into your dock space just like you walked the boat away from it earlier – even without a bow thruster.

### **Docking alongside with wind (current) blowing onto the dock**

This can be quite a bit tougher, depending on wind strength. If you approach at a 45-degree angle as in the previous example, strong wind or current could very well blow you hard into the dock – or into the boat behind us as you approach.

- 1.) So what you do is approach the dock at almost a 90-degree angle like you are going to "T-bone" the dock at about the point just a bit *aft* of where you want your bow to end up.
- 2.) Approaching the dock, you are obviously controlling your speed with reverse throttle. You definitely don't want to hit the dock with your bow pulpit or anchors!
- 3.) As you get close to the dock, start to let the stern come in with a little port rudder. Depending on the strength of the wind, the stern is going to start swinging towards the dock.
- 4.) At this point, you may have to turn your helm back hard to starboard and use differential throttle (port forward, starboard reverse) to control the speed that the stern is coming into the dock.
- 5.) Use bursts of port bow thruster to keep the bow from whacking the dock.
- 6.) If done properly, you should touch up against the dock without drama at bow then stern.

### **Docking alongside with wind (current) blowing away from the dock**

The best part about this situation is that if you misjudge your approach to the dock, just putting the engines in neutral for a few seconds will allow the wind to push us away from the dock and give us time to re-think our strategy. However, keep in mind that in most windy conditions, you have little or no momentum. Boat motion is simply a product of prop force overcoming wind resistance. As soon as you reduce throttle, you may start to be blown off the dock or at least

off your planned approach path. Be prepared and anticipate what adjustments you will make if this occurs.

- 1.) Generally, you are going to approach the dock just like the first example – on a 45-degree angle.
- 2.) The easiest method is to have a crewmember get a bow line secured as the bow gets to the dock.
- 3.) Then just put the helm hard to port and use differential throttle (port reverse, starboard forward) to twist the stern up against the dock.
- 4.) However, if you don't have someone to tie that bow line, you are going to have to use judicious bursts of starboard bow thruster to hold the bow against the dock while twisting the stern in.

In extremely windy conditions, approaching the dock on a 45 may present enough profile to the wind that we just cannot get the boat alongside.

- 1.) In this case, as we said above, T-boning the dock on a 90-degree angle will allow a crewmember to secure a bow line.
- 2.) Then twist the stern in with hard port rudder, port engine in reverse and starboard engine in forward.
- 3.) Remember that as in all the other scenarios, you are still controlling fore and aft movement with throttle amount. But in this case, you are also using quite a bit MORE throttle both forward and reverse to bring the stern in against the wind.

## **DOCKING IN A SLIP:**

Your first decision when approaching the slip is whether you are going to pull forward into the slip or reverse into it. Most GH owners will want to pull forward whenever possible as they are severely limited to rearward visibility while docking. Typically, the decision here is based on the length of the catwalk and whether it will allow you to step off your vessel from the cockpit when docked. You also want to be **ABSOLUTELY** sure that the slip is wide enough for your boat. Don't laugh! You will be amazed by how often unfamiliar dockmasters will try to direct you to 15' wide slips! Emphasize on the radio that you need **AT LEAST** a 16' wide slip. This may mean that you have to back into a very long slip that was designed for much longer boats than yours!

### **Pulling forward into a slip**

This is fairly straightforward and probably needs very little elaboration here.

- 1.) Drive down the fairway and use rudder and/or differential throttle to line the boat up facing directly into the slip.

- 2.) If you have current and/or wind blowing you up or down the fairway, you will need to adjust your turn rate and starting point accordingly so that you end up with the bow ready to pull straight in when it comes square to the slip.
- 3.) Use your steering and/or bow thruster if necessary to get the bow between the pilings.
- 4.) Just pull forward with the engines.
- 5.) If you have wind or current trying to swing your stern as you enter, you can use the bow thruster and/or an inboard piling against your "tactical" rubrail to help pivot the stern in line with the slip.

### **Backing into a slip**

This is where things get a little interesting. On an N-model, all pilothouse window treatments should be up and out of the way, BOTH pilothouse doors should be open and you should have a real good idea of where you are in relation to the pilings on your starboard side. As long as you clear these pilings fairly closely (and you have made sure that you have a wide enough slip), you know that the port side is clearing its pilings.

On a GH-model, you must have a crewmember that you trust standing in the cockpit (or on the boat deck – as conditions warrant) to call out your distances and, in general, be your eyes at the stern. Having hands-free headsets on for clear communications can make this a MUCH less stressful situation.

- 1.) As you approach your slip, ideally, you want to slow down and use differential throttle to twist the boat on its centerline until your stern is square to your slip.
- 2.) You can use a little bow thruster and rudder as need be, but the end result is that you want to have the stern square to the slip and ready to reverse straight in.
- 3.) As before, if you have current and/or wind blowing you up or down the fairway, you will need to adjust your turn rate and starting point accordingly so that you end up with the stern ready to back straight in when it comes square to the slip.
- 4.) Glance at the rudder angle indicator. Your rudders should be amidships when backing. As you found out during your exercises, these boats really cannot steer with the rudders in reverse. Always keep rudders amidships when backing into a slip.
- 5.) So, you put both engines into reverse and start backing into the slip. Your goal here is to get the stern between the first set of pilings. If you can do that, you are in.
- 6.) Control your speed by putting the engines into and out of gear.

- 7.) You will find that it is quite easy to use the bow thruster like a forward rudder to control the bow when backing.
- 8.) Once into the slip, you can use the bow thruster to help your crew get lines attached to the forward pilings too.

But what happens when you are backing and it becomes apparent that your stern is not going to go between the pilings? That's where differential throttle becomes important once again. Remember our exercises:

- 1.) Let's say that you need to move the stern over a couple feet to port to clear the first piling on your starboard side. Putting the port engine into forward and applying some throttle should immediately move the stern over to port. How far depends on how long you leave the engine in forward gear and how much throttle you give it.
- 2.) If you are backing down a long slip and just need to adjust the stern slightly, then using more throttle on one engine than the other will start the stern moving to that side and stern moving AWAY from that side. In other words, if you have your port engine idling in reverse and your starboard engine throttled up in reverse, the bow is going to start swinging to starboard and the stern is going to move (slowly at first) to port.

In this way, you can control the stern. The bow thruster controls the bow. If you do not have a thruster, putting the rubrail against an inside piling can help you pivot the bow into line. And remember; putting both engines into neutral for a second will generally help you determine your next move.

## **SUMMARY:**

Docking a Great Harbour requires a bit of finesse and technique. Remember, you are trying to control a 20-35 ton boat with two small diesels, a couple of large rudders and (in most cases) a powerful bow thruster. Here are some guidelines:

- Know how ALL the tools at your disposal affect the movement of your boat.
- DO learn to dock your boat without the bow thruster. It may fail when you need it most.
- Never approach a dock any faster than you are willing to hit it.
- Make sure your crewmembers understand what your plan is.
- Instruct crewmembers to "fend off" with fenders if necessary but to NEVER put any part of their body between the immovable dock and the 30-ton boat.
- Screaming at the crew generally doesn't do anything good for your docking, your reputation or your marriage.
- If your approach doesn't "feel" good or seems wrong, back up and start over. Don't make a bad situation worse.
- Pause and take stock periodically while docking.
- Practice, practice, practice.