



Liberty 458

General Operations Manual

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General Operations Manual

This operations manual, by its very nature, must be somewhat general in nature since there may be variables in each boat covered by changes in technique, interior arrangement, type of engine and equipment, etc. Therefore, you may need to modify these instructions slightly, depending upon the differences in your individual yacht. It is hoped that these general instructions will be of value to you in understanding the operation of your vessel and its equipment; however, we cannot be held liable for any errors or omissions herein.

Warranty

The equipment installed on your boat carries its own manufacturer's warranty. It will be the responsibility of the owner to record appropriate serial numbers in order to establish the manufacturer's warranties. In order to assist you in doing this, we provide you with a "Warranty Card List" on which you can record all of this information. You must remember that the equipment manufacturers can refuse otherwise-legitimate claims if the appropriate warranty cards, etc. have not been completed by you and sent to the manufacturers in accordance with their instructions.

Engine

The propulsion system of your Liberty 458 is obviously the most important piece of equipment on your yacht. Diesel engines will provide years of dependable service if normal maintenance procedures, as recommended by the manufacturer, are observed. Hose clamps should be checked and tightened periodically, oil levels for the hydraulic transmission and the engine itself should be checked and these fluids changed in accordance with the manufacturer's recommendations. Generally we use a **DELO 400** engine oil for the engine and automatic transmission fluid for the hydraulic transmission (**Type A**). Water levels should also be checked.

Engine Cooling System

Your engine is fresh-water cooled; that is there is a fresh water tank on top of the engine. In cooler climates, this fresh water system is usually 50% water and 50% antifreeze. In extremely cold climates, it is critical to remember that this fresh water can freeze and it's a good idea to keep a small electric heater in the engine room when the boat is left unattended during freezing periods. Frozen fresh water can result in cracked blocks, etc. Some boat owners will drain the fresh water during freezing periods but this should not be necessary if you use a good solution of antifreeze and a little heater in the engine room in extremely cold periods. Obviously, the engine water levels in the expansion tank should be checked periodically to see that the tanks are topped off properly.

The fresh water in the engine is circulated continuously throughout the engine and it obviously gets warm. In order to keep this water cool, you also have a "raw" or salt water cooling intake and water is taken from outside and, via the heat exchanger, is circulated so as to cool the fresh water. The raw water intake through-hull or seacock is located under the cabin sole in the galley¹. From there the raw water runs to a raw water strainer mounted on the starboard bulkhead in the engine room, then to the engine itself. On the outside of the hull, there is also a strainer to keep debris such as seaweed from entering into the system. The strainer on the inside of the engine room may be periodically inspected by removing the cap and strainer in order to check that no foreign matter has entered into the system. (Be sure to turn off the through-hull before removing the cap!)

As the raw water enters and cools the fresh water cooling pipes of the engine, it is exhausted through the exhaust manifold and enters the muffler (the stainless steel tank located on the aft bulkhead in the engine room) where it is combined with combustion gasses and then exhausted from the boat at the transom.

The exhaust muffler continuously holds 4"-5" of raw or salt water in the bottom and, over a period of time, could feasibly cause leaks in the manifold. Therefore, a drain plug has been installed in the bottom of the muffler in order to drain salt water out of the muffler when the engine is not in use. Some owners may wish to install a petcock to facilitate draining of water when the engine is left standing idle.

There are sailors who like to shut off all seacocks when the boat is idle, but we, personally, do not recommend doing this with the salt water intake seacock. It is quite easy to forget to turn this seacock on during the excitement of departure and, if this seacock is left closed when the engine is running, it will blow up the engine! Therefore, we recommend leaving it open at all times. Secondly, it's always a good idea when the engine is started, to look over the transom to see that it's "spitting" water out of the exhaust. If you're getting good water out of the exhaust, it means that the system is working properly and there are no impediments in the raw water cooling system.

The engine control panel system in the cockpit has an audible high temperature warning as well as a visible water temperature gauge. When underway, these gauges should be monitored **at all times** to see that temperature is in the proper range. At the same time, the oil pressure gauge on the panel should also be monitored to see that oil pressure remains constant.

Engine Alignment

It is normal for a yacht, particularly when new, to settle with minute changes in hull configuration. This will, of course, cause the engine to be slightly out of alignment with the propeller shaft. It is a good practice to have the alignment checked by a mechanic, perhaps 2-3 times during the first year of operation.

The propeller shaft is coupled to the engine at the transmission by virtue of a series of bolts; and this coupling should fit squarely on to its matching plate on the transmission. These coupling bolts should be checked for tightness periodically. The propeller shaft goes into the coupling with a keyway and there are set screws in the coupling with dimples in the shaft. These set screws should be tightened periodically and should be wired together so they cannot back out.

The propeller shaft packing gland is located under the aft cabin sole and is readily accessible. This is where the propeller shaft comes into the boat and the gland is packed with 5/16" flax packing, which is squeezed in to the packing gland, thus forming a seal. The packing gland is tightened by bolts and this compresses the flax around the shaft. These bolts should be checked **regularly** for tightness. It will be necessary to periodically adjust the tightness of these bolts. The perfect situation is that the packing gland drips very slightly when the

engine is in operation, but does not drip when the engine is idle. It is possible for the packing gland bolts to vibrate off, although they are double-nutted in order to prevent this; but this possibility should be taken into consideration and the packing gland monitored **regularly**.

Diesel Fuel System

The diesel tanks are made of black iron and run thwartship just forward of the grate at the bottom of the companionway steps. The tanks appear to be one tank but it is actually divided in the middle internally. There are removable inspection plates on the tops of the tanks with dipsticks to measure fuel levels. Frankly, the dipsticks are made of stainless and are somewhat hard to read, so we would recommend one of two things:

- a) A ¼" piece of wood dowelling be used as a dipstick, or
- b) Use the stainless dipstick and lay it immediately on a paper towel, which will give you a good indication of the "fill" level.

Also, the dipstick holes should be sealed with a non-hardening Permatex, as they are a source of leaks.

On the forward bulkhead of the engine room is a 4-knob selector valve. With this selector valve, you can select which tank you wish to draw from: port or starboard; and also which tank you wish to return the unused fuel into. Thus, you have two fuel feed valves and two return valves. If you trace down the hose from the fuel filter on that bulkhead, that will identify for you the side of the manifold that is for "feed" purposes. The fuel is sucked into the manifold, and then it goes through the fuel filter and into the engine. It would be well for you to familiarize yourself and to make up little labels for the manifold. The starboard valves are for starboard tanks and the port valves for port tanks. Thus, it is possible for you to select the fuel feed from either the starboard or port tank, returning the unused fuel to either the starboard or port tank. It would be normal to **feed** and **return** into the same tank but in certain circumstances, you may wish to redistribute fuel weight by feeding from one side and returning it to another. One of the dangers of the latter technique is it would be possible that in returning fuel to a different tank than the one you're feeding from, that tank becomes completely full and there is no place for the returned fuel to go – so the engine would choke off and die. It's for this reason that most people will **feed and return to the same tank**.

Fuel Tanks

When switching the feed (and/or return) from one tank to the other, we would recommend that before making the final tank selection, you turn on both feed valves. For example, let's say that you were feeding from the starboard tank and you wish to switch to the port tank. What you would do is about 15-20 minutes before the final change, open the feed valve from the port tank while the engine is running. If there were any air bubbles in the port system, these would normally be bled out of the engine to prevent any fuel starvation. So you would be returning and feeding from both tanks for maybe 15-20 minutes. After 15-20 minutes, you would then shut off the starboard tank and draw exclusively from the port tank. Probably at the same time, you would want to adjust the return from starboard to port.

The biggest single problem with diesel engines is getting air in the feed lines. Therefore, the hose clamps should be periodically checked and tightened and you should be familiar with how to bleed the system of air in the event this would occur. The engine operator's manual will show you how to do this. You may wish to consider installing an electric fuel pump to assist you in bleeding the system of any air that might enter into it.

Normal indication of air in the fuel system, other than a visual inspection of any leaks in the fuel system, is that the engine will start to die out on you for no apparent reason. If this happens, it is almost always air someplace in the system, i.e., an empty fuel tank where you are simply sucking air into the system. Should this happen, you should immediately switch over to the other tank and try to restart the engine. Should that fail, you will have to bleed the system of air by following the techniques in the engine operator's manual.

Obviously, the fuel filters (of which there are two) should be changed periodically and checked for any impurities in the fuel. The Racor filter is an excellent one: it has a visual bowl, and is a combination fuel filter and water separator. It is possible for condensed water to collect in the tanks from sweating and to get in the fuel system. The Racor collects this water and it's quite easy to drain out of the system from the Racor filter itself. Many sailors like to keep their tanks topped off when the boat is idle for any length of time as it is much more difficult for condensation to get into the tanks when the tanks are completely full.

Fuel fills are located on the port and starboard side decks and are identified by the word '**DIESEL**'. Almost every sailor has at one time or another filled his fuel tanks with water because he didn't look at the label on the cap! The fuel tank vent (overflow) is located in the cockpit. It's a good idea to have a little square

Tupperware container under that overflow vent when filling the tanks. It's also a good idea to keep both tank fills open when filling the tanks. An open fill also provides vent air. Thus, if you were filling the starboard tank, it's a good idea to open the fuel fill on the port tank and vice versa. The tanks may fill slowly so if you were trying to top off the tanks, you might fill the starboard tank, then fill the port tank – and then go back to both the starboard and port tanks to try to get a bit more fuel in each. However, it's very rare that you would be making a passage that would be long enough to require squeezing in every bit of fuel you can get. Don't forget that you're a sailboat!!

Engine Starting and Stopping

When starting the engine, be sure that the shifting control is in neutral. On the Perkins engine, this is a precise adjustment as the engine will not start if it is not in neutral; and sometimes if the starter is not cranking over, you'll have to "jiggle" the shifting control ever so slightly to be sure it's in exact neutral. Usually the throttle is put about halfway forward when the engine is started and then idled down when it fires off. As in automobiles, it's a good idea to let the engine warm up for 5-10 minutes before running under power².

The engine is shut off by way of a solenoid shut-off, the solenoid being located on the engine itself. Perkins has given us different ways to shut off the engine. Sometimes the shut-off is on the key itself and sometimes it's on a button – and sometimes it's on a toggle switch! The key thing to remember here is that the solenoid shut-off is electrically controlled, and the electricity comes off the key. Therefore, the key must be on in order to energize the shut-off solenoid. After the engine has shut down, then the ignition key is shut off.

In effect, the solenoid is "choking off" fuel to the engine. If, for some reason, the electrical system failed on the shut-off switch (button) because of a loose wire, etc., you can always go down and shut the engine off by operating the push rod on the solenoid manually.

Electric Fuel Pump

A valuable option to consider is an electric fuel pump with a switch in the engine room. This greatly assists in bleeding the engine in the event you get air in the system and at one time or another, all of us neglect checking our fuel levels and run out of fuel. The electric fuel pump is invaluable in assisting in bleeding the system quickly.

Steering System

The Liberty 458 has a hydraulic steering system, that system being filled with automatic transmission fluid. About the only thing that can go wrong with hydraulic steering is that it develops leaks and gets air into the system. This is quite obvious as the automatic transmission fluid is a red color and you can see it seeping out of fittings. If air is interjected into the system, the feeling on the wheel becomes somewhat “spongy” and this generally happens over a period of time. The hydraulic fluid is fed into the helm pump located inside the engine room under the pedestal by a diesel fill cap located in the cockpit just aft of the steering wheel.

Remember that a cap is not made with “Hydraulic” written on it so we have used one with “Diesel” written on it... **BUT DO NOT PUT ANY DIESEL IN THIS, ONLY AUTOMATIC TRANSMISSION FLUID (ATF) - (Type “A”).**

The best way to get air out of the system is to put a funnel in the fill cap in the cockpit and pour a little ATF into the funnel. Then turn the wheel hardover port to hardover starboard several times and watch for air bubbles being purged out through the ATF that’s in the funnel. It’s a time-consuming process to bleed the air out but you should be able to do it in about 20 minutes to ½ hour by turning the wheel hardover port to hardover starboard continuously and adding more ATF as necessary. When the bubbles cease and the “sponginess” disappears, the air has been purged.

In the event of total failure of the system, it would be necessary to steer the boat via the emergency tiller. To do this, you have to remove the mattress in the aft cabin, lift up the boards, put the emergency tiller on the top of the rudder post and steer the boat from the aft cabin. On the hydraulic ram located at the rudder post, there is a bypass valve. This bypasses the hydraulic system so when steering by emergency tiller, you must open this bypass valve so that you are operating the tiller manually and bypassing the hydraulic system. It would be only in very rare circumstances that you would have to steer the system manually and some people will carry a small automobile-type of compass in the aft cabin. The hatch would be open and the person in the cockpit would have to direct the person in the aft cabin on the proper course to steer³.

The helm pump itself (under the pedestal inside the engine room) has a small variable control knob on the forward end. (On later model boats, this has been deleted.) This knob controls the number of steering wheel turns from “hardover to hardover”. Normally we set it for a minimum number of turns, which is about four complete turns hardover to hardover. But if, for some reason, you wanted

six turns hardover to hardover, you could accomplish this via the knob on the helm pump.

Be sure to carry extra cans of ATF as this is used for both the hydraulic system as well as the automatic transmission itself.

Propeller Shaft and Rudder Post

The propeller on the Liberty 458 with the Perkins 4.236 engine has a diameter of 20" and a pitch of 15" and is a 3-bladed propeller with a right-hand rotation.

If it were ever necessary to remove the propeller shaft from the engine, you will find a "U"-shaped zinc⁴ on the forward side of the rudder. To remove the shaft, the zinc would be removed, leaving a very small aperture in the rudder through which the shaft can be pulled out⁵.

The rudderpost has a packing gland on the inside of the boat with flax packing in it, very similar to that on the propeller shaft stuffing box. In the event this packing gland starts to leak (which is much more unlikely than a leaky propeller shaft gland), you may wish to tighten the packing against the rudderpost itself by adjusting the nuts on the packing gland.

Batteries

The batteries are located under the cabin sole just forward of the step down into the aft cabin passageway. With this convenient location, there is no excuse for not periodically checking and topping off the battery water levels, which should be done with distilled water, but can be done with regular tap water in an emergency.

Since the single and most important thing in the boat is the engine, we use BATTERY #1 (identified by a piece of tape on it) exclusively for the engine. BATTERY #2 is used for all other 12V uses, such as lights, etc.

The electric windlass, if any, is connected to BATTERY #2.

When starting the engine, it is suggested to switch the battery switch under the chart table to “BOTH” and leave it that way as long as the engine is running. When the engine is shut off, always switch the battery switch to BATTERY #2, thus saving #1 for its most important function: starting the engine. It is important that the batteries not be switched to “OFF” while the engine is running as this will blow out diodes in your alternator, and should only be switched from #1 to #2 at low RPM.

Battery Charger

The battery charger is located in the engine room and has a switch and fuse on it. It is energized when at the dock by the battery charger switch on the main switch panel. The battery charger should be left on at all times when plugged into shore power in order to properly monitor the batteries, which it will do without harming them.

It's always wise to carry a spare fuse for the battery charger.

Electrical Wiring

You will find the electrical wiring system on the Liberty 458 to be of excellent quality and quite easy to read and figure out. There is a terminal block on the starboard bulkhead of the engine room, which is color coded and numbered. Wires run from the breaker switch panel, both 12V and 110V, to the terminal blocks and then to their various pieces of equipment. Twelve volt lights and some 110V wires are run the length of the boat under the removable covers under the fascia (handhold) boards along the side of the cabin trunk.

There is only one 12V outlet on the boat and that is located by the chart table. It generally has a white colored plug. Also, 12V wires along with 110V wires are run to a terminal block in the TV cabinet (if any).

All lights in the boat are 12V and run off the #2 battery. When plugged into shore power, the batteries are automatically recharged from the battery charger; but underway, the only source of power is from the engine alternator. Thus, when not plugged into shore power, it will be necessary to run the engine a minimum of one hour a day and even more than that if your boat is equipped with 12V refrigeration.

There are battery indicating gauges on your instrument panel that will tell you the condition of each of the two 120 AH batteries.

REMEMBER; ALWAYS RUN YOUR HOUSEHOLD LIGHTS, ETC. OFF BATTERY #2. SAVE BATTERY #1 FOR YOUR ENGINE.

The indicating gauges do not give accurate readings when the engine is running or the battery charger is on. For accurate readings, shut these off for a few minutes before taking your readings.

Refrigeration

Normally we have been installing Adler Barbour-type refrigerators, which run exclusively off of 12V and are attached directly to Battery #2. We install an in-line switch so that the refrigerator can be shut off easily without the necessity of going to the temperature control switch in the freezer itself. Depending on how full the freezer is and how often it is opened and closed during the day, a 12V refrigeration system can normally be expected to take as much as 50 amps a day. When you are plugged into the shore power, this is not a problem, as your battery charger will produce current faster than your household items can use it⁶.

When not connected to shore power, it is almost mandatory to run your engine a minimum of one hour a day, possibly two, to recharge your batteries⁷. The standard alternator on the engine is 55 amps.

Anchor Windlass

Normally the anchor windlass is a Nilsson vertical type with an overload protector located in the forepeak, adjacent to the windlass. The windlass is connected to Battery #2 and draws a minimum of 60 amps while running, sometimes much higher when straining. Therefore it is highly recommended that you **always** start your engine before attempting to bring in the anchor so that your alternator can compensate for the power drain of the windlass. When raising your anchor, it's a good idea to power up slowly by engine onto the anchor and let the windlass pull in the slack chain. You are not trying to pull the boat up on to the anchor with the windlass – let the engine do that for you. Also, as the windlass gets a heavy strain on it, it's good to pause so that the overload protector doesn't trip out. It is a thermostatically automatically re-settable overload switch, so if it does blow, just let everything cool off for a bit.

As you get more and more chain in, you will notice that the windlass starts to work very hard. At that point, don't try to pull anymore in, let the wave and current action of the boat itself work to loosen your anchor for you. Basically the theory is to not overload your windlass and try to pull the bottom up to the boat or the boat down to the bottom! Let your engine and/or the rocking motion of the boat itself do the pulling work for you, rather than the windlass.

Sometimes someone needs to be in the chain locker or at the least go down and make sure that the chain isn't piling up on itself.

The windlass contains a manual override in case you lose battery power and in the more common vertical windlass, it's done by inserting a crank in the top of the windlass and simply hand cranking it in.

Incidentally, your windlass provides a good source of power for going up the mast in a bosun's chair. Simply lead one of the halyards through one of the mast base turning blocks and up to the windlass. If you go up the mast this way, you will have to wrap the line from the top of the drum toward the bottom of the drum. This is the opposite way you would do it on the sheet winch. It is necessary to do it this way because the lead from the mast base is not "fair" if you wind the line from the bottom of the drum up to the top. You'll end up with overrides, which are somewhat hard to get out, particularly when someone is up at the top of the mast.

Fresh Water System

The fresh water system is composed of two stainless steel tanks in the forward stateroom(s) plus two stainless tanks in the forward part of the main salon. A selector valve manifold is located under the settee seat just to starboard of the mast. The water tank vents vary from boat to boat – in some boats, they have been vented overboard and, in some cases, the overflow vent runs into the main bilge sump. If the latter is the case, it will be necessary for you to be sure that the automatic bilge pump is on while filling tanks.

Each tank has an inspection plate with a dipstick and, as with the fuel tanks, the stainless dipsticks are hard to read. It might be worth it to keep a wooden dowel handy for this purpose, too. It is possible for the tanks to leak through the dipstick hole and we do not normally seal these up during commissioning. This is because for the first 4-5 tanks of water, you get a metallic taste. Some people like to use a drop or two of iodine in the tanks; others like to use some white wine while others prefer using baking soda. There is also a chemical additive such as “Sweet Water” available in the marine stores. After you have gone through the process of cleaning your water tanks, either by continued filling and emptying or by chemical additives, it would be good to seal the dipstick holes with non-hardening Permatex.

Water tanks are filled from four deck fittings on both port and starboard and, as with the fuel tanks, it’s a good idea to open all of the fill caps when filling any of the water tanks.

These are slow-filling tanks because it’s almost impossible to make a vent line big enough to carry away all of the pressure developing in the tank. Hopefully, opening all tank fills will ease this. You will hear your tanks “pop” as they get near full. This is because the vent hoses do not carry away the trapped air as fast as the incoming water compresses it. When you hear the popping, move to another tank and/or slow down the rate of fill.

All electric pumps, including the pressure water pump, are located under the grate at the bottom of the companionway ladder. There is an in-line filter between the tanks and the pressure water pump and it should be checked periodically as should the belt tension of that pump and the filter on the sump pump.

Pressure Water System

The hot water tank is located under the cabin sole just forward of the step into the galley. Hot water is generated from 110V power when plugged into the dock or from the engine water when underway. An interesting feature of this water heater is that there is a spare heating element in the heater. Thus, if you have a blown element, it's simply a matter of removing it, switching the wiring and you'll be using the new element. It's very important to remember that 110V power should never be put to the water heater when the water tanks are empty. Thus, if you ever run out of water, be sure to turn off the 110V water heater switch on the main switch panel, and do not energize it again until the tanks have been bled and refilled.

On some boats, we have noticed a "chattering" in the pressure water system and in other boats this has not been in existence. It almost sounds like two copper pipes are rattling together but we think it's the check valve in the water heater that is rattling. We have been able to resolve this with the addition of an inexpensive Jabsco accumulator tank under the galley sink. This accumulator tank serves as an air buffer and dampens the "chatter" of the pressure water pump. Over a period of time, that accumulator may get water inside and, therefore, should be periodically drained via the petcock at the bottom of the accumulator.

It is not at all uncommon to get air leaks in the pressure water system. This usually becomes evident when the pressure water pump cycles for a second or two when the water is not on. If this were to happen, the solution is usually found in a loose hose clamp. If the pressure water system ever continuously cycles, it means either one of two things: first, you are out of water and you should shift to another tank; or, secondly, you have burst a hose somewhere and are filling your boat with fresh water! If the latter is the case, your automatic bilge pump will also begin to cycle, assuming it's switched on.

When air gets into the pressure water system, it needs to be purged out. To do this you turn on the pressure water pump and all faucets and shower fixtures, and let the water pump through the system. When the sputtering and/or air stops coming out of the faucets, the water at the faucets and shower fixtures is turned off. It is normal to purge the air out of the faucets furthest from the pump first, shutting them off first and working toward the pump.

Sometimes with all faucets on, you don't have enough pressure to get water running out of all faucets at the same time. In this case, start with the faucet or shower fixture furthest from the pump itself. Turn it on, wait for air to be purged out and then shut it off. Then go to the next furthest fixture from the pump and

repeat the procedure. You can tell when all the air has been purged out when the pump does not cycle with all faucets and fixtures turned off.

Manual Foot Pumps

The galley has both fresh and salt water foot pumps. The fresh water foot pump is connected to the water selector valve manifold in the settee just to starboard of the mast. The salt water pump connects to a seacock under the after end of the starboard settee.

Shower Sump Pump

Each of the two showers drains into a separate “gray water” tank located under the grate at the bottom of the companionway. In this sump tank box is an automatic float switch. On one or two boats, we have also found that the aft cabin sink drain leads into this sump tank. If this is the case in your boat, it will be necessary to turn on the shower sump pump when using the aft cabin sink basin. The shower sump pump is located alongside the pressure water pump under the grating at the foot of the companionway ladder. “Gray water” is pumped overboard through a through-hull fitting at the after end of the port main salon seat. The filter on the sump pump should be checked periodically as hair and debris will collect in it and your pump will not work properly.

Bilge Pump System

The bilge pump is located under the grating at the foot of the companionway ladder. A manual hand pump is located under the cabin sole just inboard of the chart table. Both the manual and the automatic bilge pump hoses run through a strainer and down into the bottom of the sump. This strainer protects debris from getting into the sump and clogging the checkvalve-type strainer and/or clogging up the strainers on the automatic float switches.

The manual bilge pump is teed into the port cockpit scupper drain in the engine room.

It's a good idea to leave on your automatic bilge pump at all times, whether the boat is attended or unattended. That is what the pump is there for: to protect the boat against any inadvertent leak through a packing gland, fresh water system and/or seacocks. If you hear the pump cycling periodically, then you have a leak somewhere. Normally those leaks come from the propeller shaft stuffing box⁸. It is also a good idea to install a warning light somewhere that is very visible – and this will usually be in the cockpit. In very stormy and windy conditions, you could develop leaks and, of course, you wouldn't be able to hear the bilge pump pumping the water out. An "idiot" light might alarm you to the fact that, for some reason or another, your bilge pump is at work, and the reason should be immediately investigated and corrected.

Holding Tanks and WCs

The water closets are obviously located in the aft cabin and in the forepeak. Normally, there will be anti-siphon valves (fittings) at the top end of the loop of both the intake water and the discharge water hoses. These are brass fittings that should be cleaned periodically as they will corrode, thus clogging up the small hole in the top of the valve and rendering it inoperative. The early boats had holding tanks both forward and aft. Current boats only have one holding tank: in the forward head. It is technically illegal to use the aft head in port unless a special macerator pump and/or holding tank is installed, of which there are many varieties. Some people will simply use masking tape to close off the aft head and also turn off the intake and discharge seacocks. This is particularly advisable if you were ever boarded by the Coast Guard. The forward holding tank makes the boat "legal".

Waste is pumped directly from the WC into the top of the holding tank. From there it goes out the bottom of the holding tank, through a rubber hose to a seacock, which is located on the starboard side of the boat under the sail locker boards. There is an overboard vent and a pump-out valve on deck.

To use the holding tank, simply close the seacock. Then when you want to empty the tank, it can be done by opening the seacock or going to a pump-out station. When not using the holding tank, the seacock is left open and the waste passes directly through the holding tank and overboard.

Each of the toilets has "On" and "Off" valves and it is prudent to keep these intake valves on "Off", except when using the facilities.

Be sure to use only biodegradable toilet paper and this is particularly important in the forward head with the holding tank. Sanitary napkins, cigarette butts, paper towels, Kleenex, etc. are murder on a holding tank. Cleaning out clogged toilet hoses is a task that you may have to do once, but you'll never make those mistakes again!

LPG Stove

The operation of the LPG stove itself will be dependent upon the particular stove you have selected. Essentially, your installation contains a Marinetics solenoid shut-off valve system, the valve of which is located in the LPG tank compartment in the aft deck. As the valve is energized with the “On/Off” switch near the stove, the line for the LPG tank is opened and, conversely, closed when the switch is turned off. Once the stove is lit, the proper way to shut off the stove is to shut off the Marinetics solenoid switch. This allows the gas in the line from the tank to the stove to burn off. Then turn off the stove itself. When relighting the stove, it takes a couple of seconds for the LPG to get back into the line.

The biggest single problem with the LPG stoves and/or ovens is that they may go off or be blown out while they are running via a gust of wind, etc. So you must be on the alert for this possibility. If this were to happen, you will probably smell the garlic-scented LPG gas. You should shut off the stove and the Marinetics, open the portholes and turn on the fans. Do not try to relight the stove for a sufficient amount of time. Periodically you should also test all fittings with soapy water or a product called “Snoop”. If you have any leaks, bubbles will form and you can correct them.

You may smell gas in the tank compartment. This is particularly true when the bottles get very low as they have a tendency, for some reason, to smell a little bit. Also as the tanks get low and when you are lighting the stove itself, you’ll be able to smell a bit of gas and the fire will be more yellow-colored than blue-colored.

It’s always advisable and safe to open the LPG compartment to air it out occasionally and do the “bubble test” to be sure everything is OK. It is also prudent to check the drain in the LPG compartment to be sure that it doesn’t get clogged. This drain exits at the transom near the exhaust exit.

Electrical Bonding System

All seacocks and metal fittings are bonded together by virtue of a green wire. This serves to make dissimilar metals more common and thus stabilizes the through-hull system. It is possible to attach an exterior zinc anywhere along this bonding line, thus permitting any electrolysis to attack the zinc. Incidentally, zincs are commonly located on the propeller shaft and/or rudder shaft shoe. These should be checked periodically by a diver or at least at every haulout. Some mooring areas are “hot” because of extra electricity in the water, in which case zincs will deteriorate more quickly. Inspections should be made every month or so when you first move your boat to its “home”. This will give you a pretty good indication of whether or not you’re in a “hot” area.

Maintenance of Brass, Teak, Scratches, Etc.

The following are simply personal suggestions from Jo and cannot be considered as “final” as she’s always looking around for new products and easier ways to do things. If you find something that you feel is better than what we’ve suggested, please let us know so we can try it out.

Brass, Exterior

At one time we used a product called Dura-Tuff to seal the brass but it’s very expensive and very difficult to apply. Now we are using a product called Brass Guard, which is available at marine stores.

First you’ll have to obviously polish the brass. The best product we’ve found thus far is Naval Jelly. Apply it to the brass with a used or soft 3M “green scrub”. You’ll almost instantly see it start to work. Lightly clean all over the port with the green “scrub” until it’s all shiny-bright and then wash it very well with clean, clear water.

Sealing the brass will go much faster if you take a few minutes to mask off around the portholes. Don’t get any finger marks on your clean brass, as the oil and salt in your fingers will stain your beautifully polished brass. Brass Guard works much better when it’s warm outside. In fact, the warmer the temperature, the better it flows. As the temperatures lower at the end of the day, the Brass Guard becomes thick and difficult. It’s best to just stop at that point and continue the next day. In any event, use a small foam brush to apply it and work quickly. Brass Guard does not work like varnish in that you can go back over it to smooth out runs, so work quickly and carefully.

On one boat we used only one coat of Brass Guard and it didn’t hold up for more than 12 months. So we used two coats on another boat and four coats on another. It’s not necessary to sand between coats but it would be wise to try to apply 2-3 or even 4 coats all within a few days of the original coat, mainly to just get the job done. Clean very well with water, wipe clean and apply the remaining coats (this is if you are finishing up with the 2nd and 3rd coats a day or two after the original coat).

Brass, Interior

It's really not necessary to seal the interior ports, as this brass is not subjected to salt water, rain, etc. Generally just cleaning and polishing will last a long, long time.

For brass objects and decorations that are handled frequently, an outstanding sealer is an aerosol spray called "Coricone 1700 - Clear Metal Protectant". Again, clean your brass as explained above and then spray with Coricone per manufacturer's directions. We cannot emphasize strongly enough the need to clean the brass very, very well with Acetone if you are using Brasso (or similar) to remove the black residue before sealing. Smaller items can be washed with warm water; and your dish towel will show if you've cleaned it well enough and have removed all of the black residue from the Brasso - and it's ready to seal.

Oftentimes, with too much Coricone being sprayed on, you'll get grayish colored "runs" and this can most often be corrected by having a paper towel or Kleenex handy. By tipping the item slightly, you can get the "runs" to "commingle" and with a quick, light swipe with the Kleenex, you can remove the run. If for some reason, you end up with too many little "runs" and want to remove the Coricone and start over again, spray the item quickly with 409 and the Coricone will come off with a paper towel; otherwise you'll have to use paint remover to start over again. It may take a little practice to perfect your technique, but it's well worth it. I sprayed a brass pencil cup for Peter 7-8 years ago and it's still shiny.

When you initially buy a nice new shiny brass item, it's a good idea to spray it immediately so you don't have to go through the polishing routine.

Interior Teak

The interior teak has 5-6 coats of Urethane applied to it and then it's entirely handrubbed with bronze wool and paste wax; and then handbuffed. You should never have to do this again. It can be maintained very easily with your usual cleaning. We use either Amway's "Buff Up" spray furniture polish or Finis spray wax made by Liquid Gold.

If you get a scratch on the teak, it may only go through the first layer of Urethane, the first 2 layers or it may be very deep and go all the way through. In the latter case, about all you can do to cover it up is to use either Liquid Gold (in the liquid form) or a product we purchase from Daly's called "Star Scratch Remover & Polish Spray".

If, however, you're lucky and the scratch is very superficial, you use very fine bronze wool and work with the direction of the wood, rubbing very carefully

and slowly, you'll be able to rub out the scratch. You can then either put a little Johnson's Paste Wax on it and buff it, or the Amway aerosol furniture polish. If you need more specific instructions on this or are hesitant to do it in a very visible area, i.e., the main salon table, try it first on the back of a cabinet door.

Exterior Teak

BRIGHTWORK: We recommend using 5-6 coats of Captain's 1015 Varnish on the brightwork, after it's been properly cleaned and thoroughly sanded. Again, varnish is strictly personal. We've tried just about everything and keep coming back to varnish.

DECKS: Insofar as the decks, cockpit inlays, etc., there are a couple of cleaning and sealing products that can be used. For cleaning we use either a powder called Teak Brite or Teak Wonder Cleaner & Brightener or a 2-part formula like Te-Ka which we've had broken down chemically so we can make our own Te-Ka quite inexpensively. Following is the recipe for that:

 Part A: Buy from Safeway one 12 oz package of Lye. Mix about 4 oz of Lye into a one gallon glass container (wine bottle). Mix with water. Stir or shake gently. Always wear rubber gloves when using this solution.

 Part B: 1 gallon Phosphoric Acid (75% solution). Can obtain from Cascade Chemicals (in Interbay). Mix 8 to 1 with water: 8 parts water, 1 part acid.

 Wet teak and apply Part A. Let it sit 4-5 minutes and don't let it dry out - keep it wet/mist it. Hose off with high pressure hose.

 Apply Part B. Let it sit for 4-5 minutes. Again, don't let it dry. Then hose off.

It is suggested, however, that the "Te-Ka" solution not be used weekly or even monthly as it's very strong and tends to break down the soft grains in the teak too much. But every 4-5 months should be OK. You'll have to be the judge of that⁹.

If you plan to seal the decks with Teak Wonder Sealer, you should use the Teak Wonder Cleaner and then the Brightener. If you mix different cleaning products with the Teak Wonder Sealer, it will turn your decks a rather yellowish-orangish color rather than golden honey. Teak Wonder Sealer is a silicone base and will, after about 3-5 months, simply fade out totally and at that time you can clean and brighten them again, or let them go natural. It's up to you.

More Miscellaneous Trivia From Jo

 For cleaning the underside of the dodger of mildew, use either Armorall (also for the topside of the dodger) or white vinegar. I usually used white vinegar full strength on the underside.

 Be sure to turn the hot water switch off at the main switch panel when your water tanks run dry! Also turn off the pressure water switch. Turn them both on when the tanks have been filled.

 Using a large, cheap paintbrush to dust the louvers in the doors makes the job go much faster

 With regard to the freezer, it works much differently than the one in your home. It is much more effective on a yacht when it is full. There are two things in particular that are difficult to freeze on a boat: bread (because it contains too much air) and juices (orange, grapefruit) because they contain too much acid¹⁰. However, they do help to keep the freezer full!

When we were cruising, I had several net bags, all different colors. Pork would go into a blue bag; chicken into a yellow bag; ice cubes, black; etc. Using this technique, we could open the freezer and quickly pull out the appropriate bag, close the freezer and then try to find what we were looking for rather than standing with the freezer door open and letting out that precious cold air.

 It's a good idea to pour some white vinegar in each head about once a month and pump it 3-4 times, letting the vinegar deodorize the hoses¹¹.

 Women seem to have a habit of using too much toilet paper too often! Most liveboards that we know have a small decorative basket in the head for this purpose. Toilet paper will eventually clog up a holding tank if it's not completely pumped overboard (which none of us really seem to do!). When your WC gets clogged up and if you're really lucky, your husband will dismantle the WC and clean it and the hoses/fittings for you. I was lucky. Peter only made me clean out half of everything! After going through that, we obtained a "ladies' basket"¹².

 Double-back tape, which is about 1/8" thick, works great for hanging pictures, securing knick-knacks, etc¹³. Before applying the tape to the teak, be sure to clean both with a furniture cleaner or rubbing alcohol.

 The velour cushion fabric is fantastic! I almost hesitate saying this because it will be almost certain that as soon as I do, someone will put it in the dryer

and it'll shrink or will stain it with something that can't be removed. However, thus far, after about 8-9 years of personal use, we have washed it in a machine, put it in a dryer have not found anything "yet" that stained it permanently. It hasn't faded from washing or shrunk in the dryer.

 The marble on your countertops is real marble and is 1/2-3/4" thick. Marble can easily become stained so you should wax it occasionally with a marble wax or a fiberglass wax - or even a car wax so that if something does spill, it will "bead up" like on a newly-waxed automobile.

 The sinks are not "garbage disposals" so be careful as to the debris and fats that are drained overboard. Occasionally, close off the seacock(s) and pour some white vinegar down the drain to deodorize and clean the hoses out. At some point in time, you may have to use that old friend: the plumber's friend!

 Speaking of the plumber's friend, it's a great way to wash clothes when you can't get to a Laundromat. Get your biggest bucket out and your plumber's friend - and begin the agitation cycle. Use some Downy Fabric Softener with the last salt water rinse. It worked great for us and we had no salt residue in our clothes when dried.

 I usually use Amway's LOC or Industro-Clean for cleaning the exterior fiberglass. Also, we use a car cleaning product where we put a capful of liquid into a bucket of clean water.

 All boats will develop leaks. This stands to reason when you have a solid piece of fiberglass and start cutting holes in it for portholes, etc. You may not have a leak today but may develop one tomorrow or next month. The boat is "working" and it's nothing to be alarmed about. The secret is: how to stop the leak and this is a difficult subject to cover, as each leak seems to have its own "personality".

Just because the leak is, say, midway in the main cabin does not mean that that is where the leak occurs. It could be 10 feet forward of that. Sometimes, Life Caulk will cure the problem, sometimes Liquid Life Caulk and sometimes a hypodermic needle filled with a water-soluble Polyseam Seal (available at Ernst) in black color.

When using the black Life Caulk, BE SURE to mask off the area you're planning to seal. Also have a small container filled with water and liquid soap. Apply the Life Caulk and then dip your finger in the soapy water. Smooth the Life Caulk with the soapy finger. Wait about 3-8 hours before

removing the masking tape. You may need a razor blade to make a neat “cut” as you pull off the tape.

 Care should be taken to not overload the AC circuits. Simultaneous use of high-draw items such as toasters, hair dryers, electric heaters, etc. should be avoided. Thus, try not to run anything in combination that will draw more than 25 amps on one side of the boat – and this is considered a high load. If absolutely necessary to run all of these items at the same time, try to do it on separate outlets, i.e., port and starboard circuits rather than all port or all starboard.

 I won’t get into cooking but, hopefully, many of you still have that old standby around: the pressure cooker. It’s really a “must” on a boat... and you’ll save LPG at the same time. Cook whole potatoes for a while in the pressure cooker and then pop them in the oven for baked potatoes instead of an hour in the oven.

 Peter cut many 1” or so holes in the engine room bulkhead portion of the bottom step of the main companionway ladder. This is where we stored crackers and we always had crispy crackers. Of course, we were moving or running our engine almost every day. However, the longer we became “stuck” to shore power, the soggier the crackers became¹⁴!

 Peter also cut many 1-2” holes in the boards under our sleeping berth. This helped greatly to eliminate condensation and the resulting damp berth¹⁵.

 Again, this is purely personal but I usually took off the velour cover on our sleeping berth and saved it to make pillows or cover up burn holes. Also, it seems as though the sheets “slide” off much more with the velour cover on the berth.

 And, ladies, my last and final note of trivia. If hubbie acts like a typical captain and screams and yells at you a bit too much at inappropriate times (like in front of everyone on the dock), don’t be disheartened... keep your cool. Wait until you know he’s planning to go up to the top of the mast. You’re in control of the foot switch for the electric windlass. Get him up to the top, tie him off and then go for a walk, go have coffee with a friend, or write that letter you’ve been thinking about for a long time. After about an hour or so of being stuck at the top of the mast, it’s amazing how happy the captain will be with you at those same inappropriate times mentioned above¹⁶.

Addendum

Rigging

When we have completed commissioning your yacht, your rigging has been tuned properly. It is part of your general maintenance to occasionally tune it since the wire will stretch just a bit when the boat is new. It's a very simple procedure to do but if you aren't sure how to do it, call a rigger and have him do it for you.

Seacocks

Although seacocks should receive routine maintenance just like the engine or any other moving parts, many owners ignore them completely. This is probably why seacocks are often the cause of craft sinking on their moorings. So, while your boat is hauled out, dismantle all the seacocks, clean them and check for wear and corrosion. If satisfactory, grease and re-assemble them. If this is carried out every year you should not be troubled with leaking seacocks. While checking them, also look at the hoses and pipes. Are they damaged, perished or kinked? And are the hoseclamps tight and in good condition?

Miscellaneous

The wood on your boat has been air dried in Taiwan for many, many months. However, you should remember that the weather in Taiwan is very hot and humid in the summer and very rainy in the winter. The teak on your boat will shrink somewhat when it arrives here in the U.S. The weather in Seattle is so similar to that of Taiwan with the exception of the high humidity that you will have very little shrinkage. However, if you are in, say, Southern California, and if the boat arrives during the hot, dry weather in the summer, you will notice some shrinkage. But don't worry about it. As soon as the weather is a bit rainy or you start living on the boat and you will create your own moisture via cooking, showering, etc., the shrinking will abate.

We used to have one painted bulkhead (and remember that the painted surfaces have been sanded, puttied, painted, sanded, puttied, painted many, many times) that would crack just a slight bit in dry weather. Jo would tell me that it was going to rain out within the next 24 hours so we should get our outside work finished and not dilly-dally. I'd look up at the sky and there wasn't a cloud in the sky. But generally the next day it rained. What I discovered was that she was using this small crack in the painted bulkhead as a "barometer"! The crack

would swell up when rain was “in the air” and then separate again when dry weather was with us again! It was great having advance notice, particularly when we were varnishing!

One easy way to shut out the light coming through the hatches when you’re trying to sleep or when you don’t want to wake up at the crack of dawn is to buy a window shade from Standard Brands or wherever and install that on the inside of the hatch. Put a couple of little cuphooks on the opposite side; drill a couple of matching holes in the wood section of the shade and when you go to bed at night, just close the window shade. It’s much easier and cheaper than having a hatch cover made and even though you initially have good intentions of going outside to cover the hatch before you go to bed at night, you generally forget to do it.

One good way to store sugar, flour, bread crumbs, etc. is to ask your pharmacist for some of the plastic bottles that he gets his pills in from the pharmaceutical companies. They’re white in color and are about 7” high by 4” deep by 3” wide. Jo is still using these even though we’re living in a house now.

That’s it for now, folks! Remember, if you come up with any ideas, please let us know so we can add them to our operations manual

We just heard from Leroy Lammoreaux (Hull #7) and the 5 or 6 coats of Brass Guard that we put on the exterior of his portholes did not hold up on his trip from Seattle to Portland. Coincidentally he happens to be moored next to Norm Bonin (Passport 45) who put Dura-Tuff on his portholes 3 years ago and they’re still shiny!! So Leroy removed the Brass Guard with paint remover (what was left of the Brass Guard) and has applied Dura-Tuff. I guess this means that we, too, will return to recommending Dura-Tuff. However, it’s extremely difficult to work with, particularly in colder weather and is very expensive.

Also we have heard from Gary Hughs (Hull #14) regarding our comments on the “Engine Cooling System” section of this Manual. Following are Gary’s comments:

1. A 50% Ethylene Glycol (Antifreeze), 50% water solution by volume is a very effective coolant for a diesel engine. This solution will provide good protection for heat removal and cold protection.
2. A 50/50 solution, as described above, has a freeze point of -34F. At this point, the solution becomes “slushy” with some ice crystals forming. The actual solid freeze point of the 50/50 solution is considerably below -34F.

3. It is my opinion that a 50/50 solution within an engine is adequate protection for most areas where Liberty 458s may be operating. Should there be a Liberty 458 wanting to operate in an area where the engine temperature would be below -40 to -50F, considerable changes would be needed, beyond engine coolant, to cope with proper engine operation.
4. I am concerned with coolant removal in engines, forgetting to refill an engine with coolant prior to starting can cause very serious engine damage.
5. My reference to Ethylene Glycol (Antifreeze) is based on the use of a quality, name product. Cut-rate, bargain-priced products might not provide the results I have indicated.
6. I recommend that the coolant be changed every 2 to 3 years. The Ethylene Glycol and water do need to be changed due to chemical changes.

We've heard of a new "miracle" cleaner for brass from Don and Jan Miner, owners of one of our Passport 40s. They've tried it and said it's great... and easy! Just what we're all looking for! We have the supplies here but haven't had a chance to try it out yet. At any rate, it's a 50-50 solution of water and Lysol Toilet Bowl Cleaner!! (Be sure it's the toilet bowl cleaner.) We'll let you know later how well it works out for us, but maybe you'll have a chance to try it before we do.

Editor's Notes

This manual was transcribed pretty much as is from the original found on Ganache, with minor changes made when MS Word complained about little things here and there. I apologize to Peter and Jo for any newly introduced typos. The notes expressed below sometimes offer clarification on statements or describe differences we've noticed on our yacht. In some cases, I've expressed an opinion on certain recommendations in the manual and these are my opinions only.

¹ Or in the aft cabin passage way near the chart table.

² According to my diesel engine maintenance course: diesels like to work under load, and idling is not the best for them. Thus, running a diesel at the dock for half an hour in the winter is worse for it than just leaving it alone.

³ We've seen later model Liberty 458s with the emergency tiller access on deck. We are thinking of retrofitting this to ours.

⁴ On our boat this was a block of wood.

⁵ Once the rudder has been turned to one side or another.

⁶ Not when you're a liveaboard and the charger that came standard with the boat has a 20 Amp fuse!

⁷ See Note 2. Running the engine solely to charge the batteries will lug the engine, which in turn will shorten its life. If you must charge by running the engine, do so while underway, not while at anchor. Preferably, install a larger battery bank or an alternative charging system, such as a generator, solar panels or wind generator.

⁸ We've also noticed (living as we do in a temperate rainforest) that the pump cycles in periods of heavy rain, due to water entering either via the mast or the chain locker.

⁹ Overuse of "brighteners" like Te-Ka or Teak Wonder is the single biggest cause of "bark-like" teak. The teak maintenance books I've read suggest the following instead. NEVER use brighteners, or use them once right before you plan to sell the boat. Clean decks weekly or monthly with a soft mop (NEVER a bristle brush, which will also remove the soft grain) and **salt** water. You can mix some mild dish soap (lemon Joy apparently suds up well in salt water) and perhaps a teaspoon of TSP in the bucket of salt water. The decks should fade to a lovely silver color. Living in rain country, we've found that this is not enough to keep mildew from attacking the teak in the winter. My neighbors suggest a capful of bleach in the salt water; however, I'm unsure whether or not bleach attacks the soft grain.

¹⁰ And ice cream's right out. Don't even bother unless the freezer is a completely separate compartment from the fridge.

¹¹ We mix a bit of baking soda with the vinegar. This helps even more with odor and may also attack lime deposits. We also pour vegetable oil in every so often to lubricate the valves.

¹² I agreed to liveaboard on the condition that I would never have to deal with head problems. I think I got the better end of the bargain! However, I do have to hold up my end by using the basket...

¹³ We use sticky-back Velcro.

¹⁴ The solution is: Tupperware. Not the cheapo Rubbermaid stuff, but real Tupperware. It's pricey, but well worth it. I store crackers, flour, you name it, and they last sometimes longer than a year (not that you really want to eat them at that point) without a hint of sogginess. Tupperware is a boater's best friend.

¹⁵ We raised the mattress above the underlying boards by installing rows of 1/2" thick cedar panels, and then drilled many small 1/4" holes in the boards to allow air circulation. While connected to shore power, we also use a dehumidifier thingy placed under the bed.

¹⁶ I take absolutely no responsibility for any liability issues resulting from this piece of advice.