



The Professional Captain

Engine Room Quick Check

**Everything you always wanted to know, and were afraid to ask
by Captain Don Fleming**

While I was sitting on a friend's boat last month in one of my favorite Hudson River marinas, I had a chance to observe a neighboring skipper prepare his boat for the arrival of his wife and another couple. They were all going out for an enjoyable day on the river. He was quite thorough in setting up the boat and I was impressed with the way he acclimated his guests to the boat by explaining where the lifejackets were and how the head worked, among other things. I could not help but notice, however, that he never bothered to check his engine compartment in spite of his thoroughness in all other areas. It occurred to me that someone this careful would certainly check the engine room, if he only felt more confident and less intimidated about how to go about the proper procedures.

I always include an explanation and a hands-on demonstration of these procedures in my own training sessions, and I realized then that it would be a good idea to pass this on to my readers.



Going through a routine engine room quick check procedure at the beginning of the day can prevent many difficult, costly, time consuming, and dangerous developments from ever happening in the first place. You do not have to be a trained mechanic to do it properly. You can learn to use your common sense to look for the obvious, and to check the necessary by simply reading this article and following the procedures step by step until they become second nature.

I will discuss what and how to check a typical inboard/outboard boat this month cover inboards and generators next month.

The typical modern inboard/outboard marine engine is basically an automobile engine, usually V-8, and often a Chevy Block, that has had its cooling system and a few other parts adapted for marine use. You are basically checking many of the same items that you would in a car.

I will discuss each item in detail in order to give a good understanding of not only what to do but how to do it, but also why it should be done. It may seem more complicated than it really is at first, but if you take your time in the beginning and follow the article, you should be able to run through this "Quick Check" in about 10 minutes after you are familiar with the routine. Also, an Engine Room Quick Check Summary Sheet is included in this issue so that you can cut it out and perhaps laminate it to keep on the boat for a handy reference guide.

As you open the engine hatch, your first procedure will be to check fluids. The first and most vital of all fluids is your engine's oil. Locate the dipstick and check the oil level making certain that you hold the tip of the dipstick down so that the oil does not flow up the stick giving you a false reading (See Figure 1). The difference between "Full" and "Low" is usually one quart on a typical V-8, but be sure you add the manufacturer's suggested type and weight of oil by checking your owner's manual and/or ask your marina service manager.

Considerable damage can be done by using the wrong oil, so it pays to find the correct type and stock on a few quarts. This

procedure is wise for all fluids and lubricants used throughout the engine room. The industry standard for motor oil used to be 30W high detergent, but manufactures have been recommending a variety of multi-weights recently, so it is especially important to check if you have a late model boat.



Figure 2. includes (a) Power Steering pump and reservoir (b) engine cooling hoses and (c) "vee" belts.

The next fluid to check is the power steering fluid located in the power steering pump reservoir at the front of the engine usually near to the top right hand side (see Figure 2). The unit is connected to the main crankshaft pulley of the engine by a "vee" belt that drives the power steering pump. The dipstick is usually built into the fill cap. Wipe it clean and you will notice that one side reads "full cold" and the other higher up on the dipstick reads "full hot." This is because the fluid expands as the engine warms up to operating temperature. In 99% of the cases, the fluid to add, if it is needed, is the Automatic Transmission Fluid (ATF), known generically as Dextron II, but always check the manufacture's recommended fluid before topping off.

In an emergency, of course, the boat can be run without the fluid. Steering will be difficult, and you will burn out your steering pump unless you disconnect the "vee" belt, but you can get back without it, if you have to.

This is also true of the third fluid that needs checking, the trim tab hydraulic reservoir. It also usually uses Dextron II and is not essential in an emergency. The pump and reservoir are a self-contained unit and they are often mounted on the inside of the transom wall or on the aft side wall of the engine compartment (see Figure 3). They can be tricky little devils to find on some boats and nearly impossible to reach to fill on others. They can always be located, however, by tracing the thin black hydraulic lines coming through the transom from the trim tabs to the pump reservoir unit. Many of these units have a translucent reservoir so you can check the fluid level by simply shining a flashlight on the side of the tank while looking at the front face. The fill plug is usually very small and is often under a clear tinted plastic cover sitting on the top of the unit. Remove the screw on top of the cover and lift the cover off to get to the fill plug. It is helpful to have an extremely small diameter funnel to pour the fluid into the fill hole.



Figure 3. Includes (a) trim tab hydraulic reservoir and (b) hydraulic oil drive trim pump, located in the port aft corner of the engine compartment of the Formula 242 SS.

If your engine is fresh water cooled, you will want to check the coolant level at the radiator type pressure release cap that sits on top of the heat exchanger at the front of the engine. Be sure to fill with a 50 to 50 mixture of water and antifreeze. Many skippers make up the mixture ahead of time and store it in a plastic jerry can in order to save time. Be certain to tighten the radiator type pressure release cap evenly and securely to prevent it from blowing off and dumping all your coolant while you are running. If your boat is raw water cooled, you get to skip this step.

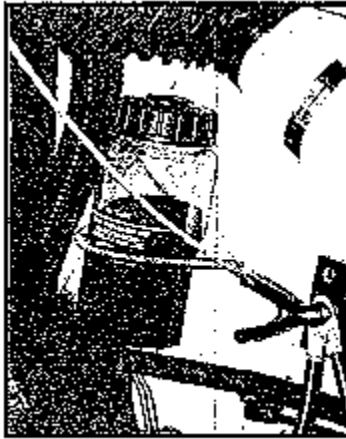


Figure 4: Includes the outdrive oil monitoring reservoir.

Many boats also now have a translucent reservoir at the base of the outdrive hydraulic trim pump as Mercruiser does. This is the hydraulic pump which raises and lowers the outdrive unit. Give it a visual check if you have one, and top it off with the manufacturer's recommended fluid, if necessary. The entire unit is usually located along the inside transom wall, often in one of the aft corners of the compartment (see Figure 3). Boats a few years older will certainly have the pump, but may not have the reservoir. If this is the case on our boat, you're allowed to move directly to "GO" and collect \$200.00 again!

Finally, some boats also come equipped with an outdrive oil monitoring reservoir. The Mercruiser version is a clear plastic cylinder that looks like a jar (see Figure 4). The oil in this monitor flows directly into the outdrive unit to replace any oil that might leak or weep out the unit due to faulty seals and/or gaskets. This monitor reservoir is often confused with the outdrive trim pump which as discussed above raises and lowers the outdrive unit. The outdrive oil monitor discussed here is a reserve reservoir for the actual outdrive gear lubricating oil, and it has nothing to do with raising and lowering the outdrive unit. This monitor reservoir should not only be checked for proper level, but should also be checked to see if the oil in the reservoir has a milky color to it. If this is the case, it is a sign that sea water has seeped into the outdrive oil. If it has, it will very quickly destroy the bearings and gears in the outdrive, so be sure not to run the boat if this condition is observed. Again, be sure to check with the manufacturer's recommended fluid before topping off as there are great differences between Mercruiser, OMC, and Volvo-Penta, just to name a few. This is one reservoir you don't want to just fill it up and forget about. If the level is low, you have to ask yourself, why? Most likely the answer is an expensive one because the seals and gaskets of the outdrive unit are quickly leaking, but catching it early can make a big difference in just how expensive it will be.

Congratulations! You have now checked all your fluids. IT may sound like a great deal now, but as I mentioned earlier, it will only take a few minutes once you are used to it.

The next item to check is your fuel line, and its related connectors (see Figure 1). For the most part this is a visual check of the fuel line running from the fuel tank to the engine through the primary fuel filter. The part is a rubber hose, often red in color, that connects from the tank to the fuel filter which is usually located on the lower left front end of the engine. Check all connectors, usually brass hexagon nuts, looking for the moisture of leaking or weeping fuel. Check the connector on the filter itself, and trace the fuel line from the filter to the carburetor. Sometimes it is easier to feel for the moisture with your hand in spaces where getting a good all around view is difficult.



Figure 5: Includes (a) fuel line and connector at the base of the carburetor and (b) yellowish clear plastic overflow hose.

Finally, many newer engines have a yellowish green clear plastic overflow hose running from the fuel pump to the carburetor, (see Figure 5). Check this line, if applicable, to see that it is empty and clean. This is a safety device that kicks in if the diaphragm on the fuel pump ruptures. It sends the fuel up to the carburetor preventing it from spilling into the bilge, and as stated above, it should be clear under normal conditions.

After you have checked the fuel system for leaks, the next step is to check your "vee" belts for proper tension and wear. Most boats have between two and three "vee" belts at the front of the engine to drive various components, such as the aforementioned power steering pump and the all important alternator. Proper belt tension is about 1/2 inch of play, and this can be measured by twisting the belt 1/2 turn with your hand. Proper tension is especially important with regard to the alternator which will not charge the battery properly if the belt is slipping even slightly.

It is well worth the effort to tighten the tension of the belt, if it is needed. This is a fairly simple procedure that involves loosening a few bolts: usually one at the base of the alternator where it is connected to the engine block, and another at the arc-like rotating arm on the opposite end of the front of the alternator. Once these bolts are loosened, take a pry bar, or another fairly long steady object like a very large screwdriver, and place it between the alternator and the engine block. Apply moderate pressure to swing the alternator out a bit along the arc. It helps if someone can hold the pry bar in place for you as the bolts are re-tightened. Re-check the tension by giving the belt a 1/2 twist and re-adjust, if necessary. Over tightening of the belts is to be avoided as it will create excess wear. Also, it is a good idea to carry extra belts and know how to replace them as this simple procedure can save a considerable amount of time, expense, and inconvenience.



Figure 6: Includes (a) Bilge pump and (b) float switch along with various connecting hoses.

If you have checked the belt tension and all is well, spend an extra few seconds checking for wear. Look at the areas where the belts turn around the pulleys to see if much "belt dust" has accumulated on any nearby bulkheads, stringers, or floors, etc. If the belts are not running true around the pulleys, this black rubber "belt dust" will be a sure sign of excessive wear.

The next item to check is the batteries. Open them up by removing the plastic caps on top and see if the water level is low. It is best to fill them with distilled water because the metals in ordinary tap water contaminate the battery and reduce the life span of the plates. If your boat is being charged at the dock by a constavolt, you should expect to have to top your batteries once or twice per month. Also, check the battery terminals to see that they are free of corrosion and tight. Loose and/or dirty terminals can severely effect the entire electrical system so do not overlook this simple and easy check. Finally, be sure that all spark prevention terminal guards, battery box covers, etc are properly secured.

After you have checked the batteries, the next step is to check the operation of all bilge pumps and float switches in the boat. These pumps are your first line of defense should you start to take on water, so you want to be sure that you know not only the exact locations of each one but that each is working properly. I still maintain that on a small craft, the best bilge pump is a frightened person with a bucket, but the bilge pumps are a good back up.

Checking the electric bilge pumps is a simple matter of lifting the float switch next to the pump and listening for the sound of the pump going on (see Figure 6). These float switches and pumps can burn out at times if a piece of debris gets caught under the float and the pump remains on long after the water has been pumped out. Some float switches have a plastic guard over them to prevent this from happening, but I like to remove the guard and lift the float just to be sure everything is in working order. Manual bilge pumps, if they are installed for emergency back up, should be pumped a few times and the overboard flow and internal lines should be checked for leaks and/or loose clamps.

As we get near to the end of our checking procedures, you will now see that all connections are tight and secure. Start with your engine cooling hoses by inspecting hose clamps and conditions of the hoses. It is a good idea to squeeze each hose to get an idea of how firm each one is under normal conditions. Check for small cracks and wear as you move from hose to hose. Tighten any loose clamps. It is also a good idea to carry an extra set of cooling hoses and a few extra appropriately sized clamps on the boat so that you can replace a hose, if it should blow while underway.

Check your throttle and gear shift linkage by having someone move the dash connectors. Also check to see that the moving parts are properly lubricated with grease. Check the writing on the engine to see that all connectors are tight and secure. Check the hoses of the blower fan to be sure that there is an unimpeded run from the bottom of the bilge out to the exhaust grill on the side of the boat. Look for cracks and cuts in the hose, and tighten any loose clamps. Check all through hull fittings, sea strainers, and seacocks to be sure they are secure, clean, and opened. More will be said about those few items when we discuss inboards next month.

You have now completed a very thorough and complete engine room check. By following this procedure each time before you go out, you will have more confidence in your boat because you will feel less anxious about mechanical failure. Your family and guests will also feel much safer and secure knowing that you have checked to be certain that all systems are GO. Of course, on longer trips, periodic checks of the boat's systems are necessary, and often an engineering log is kept to record these checks in a simple and straight forward manner, but that is the subject of a future article.

Before concluding, I would like to express my appreciation to the wonderful people at Charles Point Marine in Peekskill, Mike and Ginny DiForio and their staff, who allowed me to poke around and photograph their outstanding new 24 ft. Formula 242 SS Sun Sport and their new 36 ft. Formula Performance Cruiser. These are truly great boats that I have operated first hand on numerous occasions during deliveries and hands-on training sessions with their proud new owners. I would also like to thank their ace mechanic, Bobby Tencza, for providing some very valuable technical expertise. If you have not visited their beautiful marina complex, I would highly recommend it to you. Mike and Ginny would be happy to show you a new formula or have their experienced, friendly staff provide any number of marina services when you're cruising in the area.

Ed. Note: We have included a check list that you might want to clip out and save as a reminder of what must be routinely checked.

Next month: [ENGINE ROOM QUICK CHECK FOR INBOARDS AND GENERATORS.](#)

*Captain Don Fleming is a licensed USCG Operator with over 25 years experience in sail and power vessels up to one hundred tons in both local area as well as ocean voyaging and racing from Maine to Grenada. He is well know throughout the area for his hands-on training programs that range from close-quartered docking and maneuvering to navigation, electronics, and ocean passage making skills. Questions or inquiries to Captain Don may be addressed to: Don Fleming Yacht Services Inc., 506 Eagle Bay Drive, Ossining, N.Y. 10562 914-941-3998.
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BOATING

On The
Hudson

ENGINE ROOM QUICK CHECK LIST FOR INBOARD/OUTBOARD ENGINES

1. Check fluids and top off as necessary. Use blank lines to fill in fluid type for our specific boat. Note: Be sure to use only manufacturer's recommended fluids.
 - engine oil _____
 - power steering fluid _____
 - trim tab reservoir _____
 - engine coolant for fresh water cooled engines _____
 - hydraulic outdrive trim pump _____
2. Check fuel lines and connectors for moisture.
3. Check "vee" belts for proper tension and excess wear.
4. Check battery water level and top off, if necessary.
 - use distilled water
 - tighten all terminals, guards, and covers securely.
5. Check all bilge pumps and float switches.
6. Check engine coolant hoses.
7. Check throttle and gear shift linkage.
8. Check engine wiring.
9. Check blower hoses.
10. Check all thru-hull fittings.

