Catalina 350



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From the Desk of Gerry Douglas

There have been some C350 owners concerned about noise and/or vibration from the prop. The degree of the noise/vibration seems to vary greatly from boat to boat and owner to owner because this is a very subjective issue and not measurable in any practical way.

It is my experience that every boat will experience cavitation at certain times. Simply stated, this occurs when the propeller blade speed through the water exceeds the speed of the water flow over the blade surface, leaving negative space behind the blade that is filled with oxygen pulled out of the water. When the flow "catches up" with the blade speed, the cavitation stops. (This is an oversimplification of a technical explanation, but basically correct).

The conditions that can create cavitation are typically when the boat speed through the water is temporarily slowed by a head sea or when or when rapidly accelerating and continues until the boat speed through the water catches up with the prop speed.

There are ways to minimize the cavitation noise/vibration: one is to use a smaller diameter prop (this would be much less efficient); another is to slow the prop speed (this would require a much larger prop to achieve hull speed). The most practical is to decrease diameter to reduce tip speed and increase blade areas to compensate for the diameter reduction and improve flow characteristics over the blade. The prop originally fitted to the C350 was 15" diameter, 9" pitch, with three blades – a good compromise as is every sailboat prop, where minimum drag under sail and efficiency under power are balanced.

In order to address the concerns of C350 owners about momentary cavitation, we solicited the help of several C350 owners, on both coasts, to do parallel testing of alternate prop designs. Three different designs were tested. During the test, Michigan Wheel, Catalina's prop supplier, introduced a new style prop designated the "M" series. Tests proved that the "M" series prop combined the best performance under power with minimum cavitation. The "M" series has a wider blade and therefore more frontal area than a traditional sailor prop and will produce slightly more drag under sail. All sail boat props are a compromise so racers or light air sailors may choose to stay with the original factory-supplied prop.

Catalina will make the new "M" series prop available to C350 owners who wish to change props, at our cost of $195.00 plus shipping. There are a limited number of props available at any one time so we may not be able to fill all orders at once. The props will be shipped from the Largo, Florida plant and can be ordered from Customer Service in Largo or through the Parts Department in Woodland Hills, CA.

Catalina has started installing the new Michigan Wheel "M" series Sailor prop on hull number 400 and higher standard.

Thank you to the C350 owners on both coasts who participated in the prop testing program.

Air Conditioning Installation

You know the drill. Snag the last dock cart, fill it to overflowing and truck it down to the boat. Now pull the companion way boards out and step into the sauna. Now you are faced with the daunting task of putting clean sheets on the V berth without dehydrating.

I'll admit it – I used to consider air conditioning a real luxury on a sail boat. When I placed my order for a new 350, I hadn't planned on A/C but a friend of mine talked me into it. It was one of the best upgrades I've installed so far. Not only is it a pleasure to be on the boat twelve months a year, but I also enjoy the additional benefit of having an industrial strength dehumidifier.

The main parts of a dual cycle system (air conditioning and heat) involve a raw water pump, the compressor/condensor, and a thermostat. I decided on a Mermaid M16 16,500 BTU reverse cycle system. It was reasonably priced, has a 5 year warranty and their tech support was readily available. With one season under my belt, the only complaint I have concerns the noise level of the compressor. If you sleep in the aft cabin, this might be an issue, depending on your tolerance for noise.



Compressor & Ducts



Condensator



Thruhull & Pump

During the commissioning of my boat, I installed a dedicated through hull that is accessible in the main part of the bilge. This supplies water to dissipate heat from the compressor. The inlet is about a foot from the keel on the port side. I selected this location to minimize the possibility of air entering the system when the boat heels and it is easy to access.

Just a few feet away, I mounted the 115 volt A/C raw water pump. I used a March LC3CPMD which is more than adequate for this application. It will pump 490 gph at a 3 foot head.

Placement of the compressor/condensing unit posed the greatest problem in the installation. I ended up cutting away about 16 inches of the Starboard® edge of the top shelf in the "walk in" lazarette. I then cut a piece of 3/4" plywood about 24" x 18" and attached the inboard edge to a set of "legs" that allow it to rest on the fiberglass shelf forward of where the hatch boards are stowed. The outboard end of this piece


V-Berth Outlet

lays on top of the shelf in the lazarette. I mounted a 2"x2" cleat on the bulkhead just inboard of the shelf. This serves to support the forward edge of the plywood. I placed a piece of 1/2 thick foam that I purchased at Home Depot between the plywood and the shelf. This helps reduce vibration from the unit. The plywood is screwed to the cleat and the top lazarette shelf. This provides a very stable base to hold the compressor/condensor. Underneath the shelf, I installed the box that houses the electrical connections to the pump, thermostat and 115V power.

The next chore was routing the duct work from the unit to the rest of the boat. I ordered a left discharge system which means that the cold air supply exits the unit to the left of the return air supply. I obtained all my air handling fittings (wyes, elbows, ducting) directly from Mermaid. I used a plastic 6x6x4 wye coming directly from the discharge port. The 4 inch branch went to the aft cabin and the other leg of the wye connected to another 6x6x4 inch wye. One 6 inch leg feeds the main salon and the 4 inch leg goes to the V berth. The blue foam you see on the ductwork in the lazarette is insulation. If found that there was sweating on the ducts and the insulation took care of that problem nicely.

Fortunately, Catalina installs a four inch duct from the lazarette to the V berth. Situating the air grill proved to be a bit more of a challenge. I ended up cutting a piece of Melamine to fit in the corner above the cabinet on the starboard side next to the bulkhead. This is the longest run of duct work and the ducting is not insulated. With the door closed to the V berth, the air flow to this area is adequate except on very hot days. In this case the door can be left open to improve ventilation.

I located the thermostat in the main salon above the electrical panel. This area is protected from direct sunlight and away from the flow of air from the ducting. I especially like the ability to program the system. I have it set to run for 20 minutes daily to keep the humidity down. We usually arrive at the boat on Saturday afternoon around 4:00 pm so I set the unit to come on at one o'clock and the boat is nice and cool when we arrive.

Condensation from the evaporator should be routed outside the boat. Since the unit is mounted fairly high above the waterline, I suspect a gravity drain would have worked fine but would entail drilling another hole through the hull. Instead I opted for Mermaid's Condensator® . This is a brass fitting that is plumbed into the discharge line for the cooling water and works on the venturi principle. It actively sucks the condensate from the pan surrounding the unit when the pump is running. It works great.

Overall, I'm very pleased with the system. Installation took a couple of weekends and wasn't terribly difficult. My only complaint centers around the noise issue. However, I'll be the first to admit that the trade off of cool vs. noise is well worth the price. *–Ken Krawford, s/v Gailforce II, Hull #351*

Three Steps to Improved Refrigerator Performance

Judging by the number of e-mails posted on the various Catalina forums, refrigeration, or the lack thereof, seems to be one of the major faults attributed to the C350. Some owners have come to the conclusion that more insulation was needed and have drilled holes thru the box liner to inject expandable foam while others have reconfigured the air exchange between the freezer and the refrigerator by relocating the fan. Make Way's (hull#207) refrigeration system was also woefully inadequate as delivered from the fine folks at Catalina. A 20 pound bock of ice placed into the bottom of the freezer section would melt within two to three days while the evaporator unit (the metal box inside the freezer compartment) would build up close to an inch of ice, making it necessary to defrost the unit every week. Upon looking at numerous web sites and carefully reviewing the Adler/Barbour literature concerning installation, insulation and venting requirements versus the Adler/Barbour "Cold Machine" as installed on my C350, I determined that the poor performance of my refrigerator was due to:

- Inadequate sealing between the counter top and the refrigerator/freeze compartments as well as crevasses between the refrigerator door and ice box. The inadequate sealing permitted an enormous amount of outside air to enter the box which resulted in the excessive buildup of ice on the evaporator coils.
- inadequate venting of the compressor and condenser unit which is located near the hot water heater on the starboard side aft. As installed, the unit works in a relatively enclosed non-vented space which can easily have an ambient environment of well over 100$f\mu$ F.
- an excessive refrigerant charge.


Car windshield sunscreen folded to stop freezer condensaton on counter.


Adler Barbour Refrigeration Unit

Believing that the lack of ventilation was the primary cause of the poor performance, I had Tidewater Marine install the Adler/Barbour C8071 Power Duct Kit while we were waiting for a replacement fuel injector pump from Westerbeke. The power duct kit, which consists of a shroud that mounts to the front of the condenser, a 4 inch duct and an in-line duct blower assembly draws cooling air from the bottom of the boat near the galley sink and directs it through the condenser coils. The warm air within the immediate vicinity of the compressor is directed toward the aft starboard clam shell vent by means of a "Y" connection to the engine vent hose.

The refrigeration unit fitted with the Power Duct Kit exhibited a substantial improvement in cooling and a reduction in duty cycle time, until the evaporator coils began to ice up. Thereafter, the cooling capacity of the unit diminished markedly. Keeping the evaporator unit from building up an insulating layer of ice became the next priority. After a detailed look, by means of inspection mirror at the counter top, refrigerator

door and refrigerator box interface, it was clear that crevasses between the mating surfaces needed to be sealed to precluded outside air from entering the cavity. Expandable foam insulation was injected between the surfaces to make an air tight seal. The use of expandable foam rather than putty has the advantage of deeper penetration and better stability in varying temperatures. Sealing the box in this manner and fitting the improved lid insulator kit available from Catalina on request eliminated the need for weekly defrosting of the refrigerator/freeze unit. With normal use, the refrigerator/freezer can go six to eight weeks between defrosting. Additionally, the compressor run time has decreased markedly and the temperature of the freezer compartment ranges at 10 to 15 degrees Fahrenheit (-10 to -12.2 Centigrade) at a setting of 4. Temperatures in the evaporator box are near zero and the refrigerator holds a temperature of 37 to 40 degrees.

With the refrigerator/freezer holding temperature, the next priority is to further reduce the cycle time. A quick solution is to fill the box as much as possible to reduce the amount of air in the refrigerator/freezer and to create a "heat sink" through the mass of the products within the unit. While some may choose a block of ice, the freezer ice packs available in most supermarkets do a fine job in stabilizing the temperature, especially if they are placed into the unit after having been cooled to -10 or -20 degrees Fahrenheit in a home freezer. Gin, Rum or Bourbon cooled to such a temperature also works very well and decreases the amount of nonproductive space used for the establishment of a proper heat sink.

If the performance of the refrigerator/freezer unit in your boat is less than satisfactory or the unit runs excessively or fails to hold temperature check for:

- air leaks by monitoring the speed of ice build up on the evaporator
- excessive temperature buildup around the compressor/condenser and improve the air flow by installing a power vent unit
- a sufficient heat sink, consume it before it becomes too warm to enjoy and call your Adler/Barbour service representative and have him adjust the refrigerant charge in the system.

The modifications/improvements described above can be made in an afternoon! –*Armin Wachsmuth, Make Way, Hull #207*