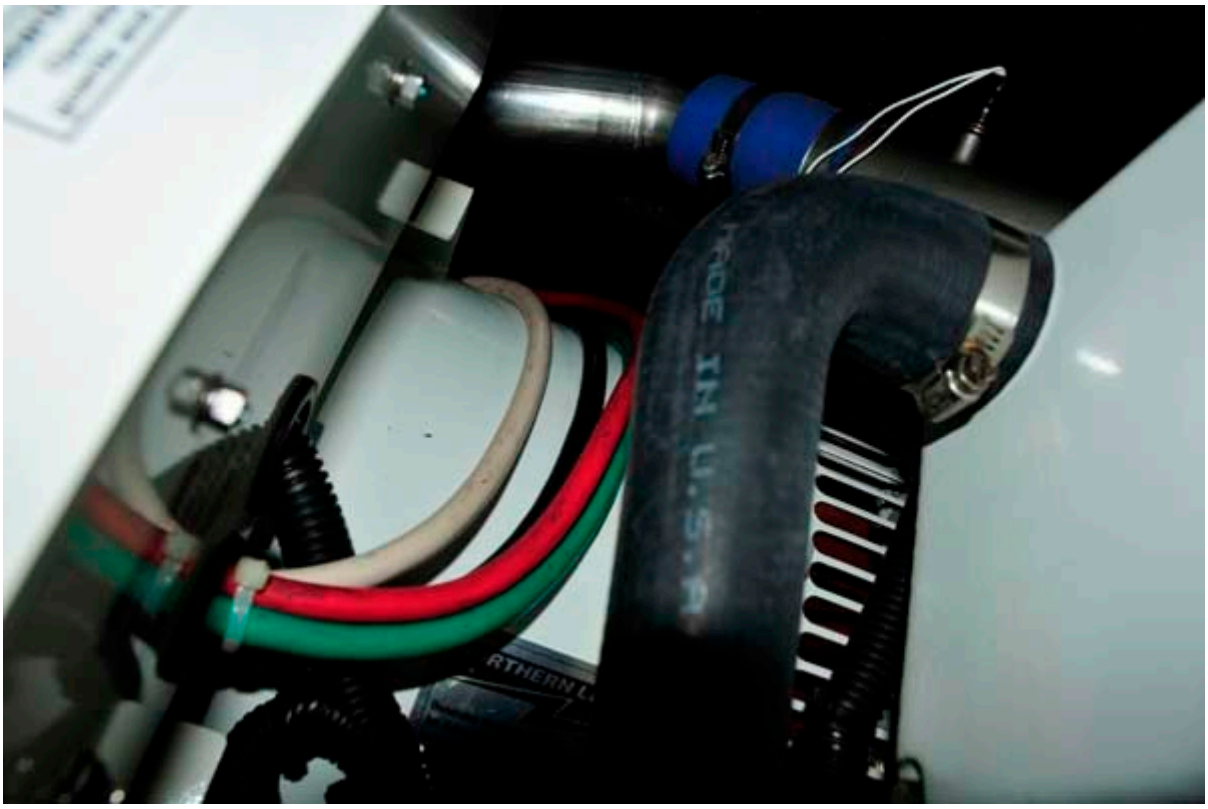
November 2016 Newsletter

Text and photos by Steve D’Antonio

Photo Essay: Generator Wiring



Today, generators are commonplace aboard cruising power and sailing vessels, providing near-limitless AC electricity for refrigeration, air-conditioning, water makers and other appliances. The power they produce is veritably the same as that found in homes ashore, 120 and 240 volts, at 50 or 60 Hertz depending on whether the vessel is designed for use in North America or elsewhere in the world. Make no mistake about it, this voltage is potentially lethal, and thus it, and the wiring associated with it, must be accorded the same respect as the power that originates on the dock and from the utility company.

Provided they are installed in accordance with the

manufacturer's instructions, generators from reputable manufacturers can be expected to produce power safely, and reliably. When things go wrong it's often at the interface between the genset manufacturer and the boat builder or boat yard installing the generator. Guidelines set forth by the American Boat and Yacht Council (ABYC) clearly spell out generator installation requirements. One of the more frequent violations of these guidelines involves the wiring installed by boat builders and installers, connecting the generator's output to the vessel's electrical system. The ABYC Standard clearly defines what's needed, *"Each lead provided for wiring to the generator set, or for interconnection between parts of the generator, shall be provided with a means to prevent stress from being transmitted to internal connections when subjected to an axial pull of nine kg (20 pounds), applied for one minute, without any displacement."* In other words, a means of strain relief should be provided to prevent tension on the wires from being transmitted to the connections within the junction box.

In the accompanying photo the wiring, which is installed by the boat builder, used to convey the generator's output, lacks the required strain relief, tugging on these wires imparts stress directly to the ring terminals in the junction box. Furthermore, the wiring, which lacks sheathing or support of any sort, is simply laying across the top of the generator housing, subjecting it to vibration, chafe and a potential short circuit or electrocution risk.

Ask Steve

Hello Steve,

We are in the planning stages for our next sail boat. It will be a new off-shore mono haul, 54-60 LOA (Oyster/ Gunfleet/

Hylas/ HR). Our plan is to do a circumnavigation in 2-3 years from now. I read with great interest your exchange with Nigel Calder in one of the trawler magazines about hybrid propulsion and I wholeheartedly agree with your take, which leads me to my two, somewhat related questions:

1) Most newer diesel engines, even the Yanmars, feature common rail diesel injection. While this is a proven technology in cars, trucks and other industrial equipment, I am worried about the “cutting edge” technology once you are stranded in the South-Pacific Islands with no access to spare parts and no highly qualified mechanics that owns the computer necessary to reset or re-program the controller.

2) More and more yacht if this size also come with distributed power system. While this technology significantly reduces the number and size of electrical wires in the boats, it again depends on brand specific parts and programming to trouble shoot/repair.

In both cases, I am most worried about a lightning strike after which not only all electronic would be fried, but now also could not run my engine and all of my digital powers switches/nodes would also be history.

What’s your take?

Thank you.

Daniel Wolff

Daniel:

Thanks for the note, comments and for the queries, you’ve posed some very good questions, very good indeed. They are the right questions for someone who is preparing to cruise offshore for extended periods.

As far as common rail engines are concerned, these days it would be difficult to source a new diesel engine above 100 hp

that wasn't electronically controlled, so I'm not sure you have much of a choice. Doom and gloom was predicted by detractors when these engines were first introduced to the marine market, many scrambled to get the last of the mechanical engines. Few of those predictions came true, electronic engines have proven incredibly reliable, and more efficient, and self-diagnostic, and less smoky, and quieter at idle…you get the point. One of the reasons these engines are so reliable, unlike other new marine industry products, is because they had millions of over the road miles under their (fan) belts, in commercial over the road trucks, before the first one was ever installed aboard a boat, they were thoroughly vetted. Having said that, with more electronics comes more vulnerability to voltage issues and of course lightning. For a sailing vessel, and for greatest reliability when cruising remotely, if you did have a choice, I would choose a mechanical engine, however, unless you opt for a re-manufactured engine, I don't believe you'll have a choice. At least you will have an alternative means of propulsion in your sails. The vessel's lightning protection system should, at a minimum, comply with ABYC chapter TE-4, and this is especially important for catamarans, which are statistically more prone to lightning strikes.

Distributed power is another issue entirely, it's far from a foregone conclusion, and the majority of builders have, at least for now, chosen not to use it. Indeed, it offers a range of advantages and versatility, especially if you are one of those people who gets a kick out of dimming your lights or changing your thermostat via your phone or tablet. My primary concern, however, in addition to a lightning strike, which is a statistical rarity, is after sale support. Since distributed power systems made their first appearance a number of manufacturers have come and gone, and even those that have stayed have moved through several generations of products, with parts availability for earlier versions spotty at best. I would ask your builder of choice what assurance they can

give you for a ten year support window, and what will they do should the manufacturer they (and whose product they will no doubt mark up, and profit from) choose for the DP system go under, or stop making or supporting your vessel's system? Even with iron-clad assurances, I would be very reluctant to opt for a DP system on a vessel of this sort, one whose system reliability is so vital, and one for whom support may be many thousands of miles away should a failure occur. Boat builders, by the way, also come and go so their assurance of support may also be of limited value.

Hello Steve,

I have 3 questions to ask you.

1) I have my boat at a shipyard in Dania, FL and need to have the shaft alignment checked as the starboard shaft is very hard to turn compared to the port. I replaced the shaft bearing and shafts about 300 hours of run time ago and it did not feel correct then. I believe the problem is with the bearing in the hull.

My question is, could you recommend a good company to check the alignment?

2) In the seven and a half years I have owned my boat it has been broken into twice and ransacked. And the last time (last week) the thieves tried to leave the dock. I always close all sea strainers… this apparently stopped them from getting away.

My question is what, should I check for damage besides my water pumps? I have been out of the country and have not seen the condition the boat is in now.

3) Do you have any recommendations for security alarms or cameras?

When I leave my boat I feel safer with everything off and

shore power disconnected. That is the reason I have not installed cameras that might drain the batteries.

Thanks in advance for any recommendations or advice you can offer me.

Kind Regards,

Lee Schoenmeyer

Dear Lee:

You've posed some important questions. I'm afraid I'm unable to recommend specific service providers. Whomever you do choose for this service, they should be capable of carrying out laser or precision optical alignment. Try Googling 'optical scope alignment marine' for those who offer this sort of service.

If the engines were run without raw water and they overheated, then significant damage could have been done to both the engines and the exhaust system. A careful visual inspection of the exhaust system should be carried out first. If you have no exhaust system temperature alarm, damage can and often does occur before the engine overheat alarms sound. Hoses should be carefully checked for overheating damage. If the thieves disregarded the engine overheat alarm, if it sounded, then damage may have also occurred to the engines. After the exhaust system is inspected the raw water pump impellers should be replaced by a competent mechanic, and any impeller pieces retrieved from the heat exchanger, where they will have accumulated. The coolant level should also be checked. Once the engines are started, the vessel should be sea trialed, again, under the watchful eye of a skilled, experienced mechanic who is familiar with your engines.

As far as cameras are concerned, you can easily and inexpensively purchase common domestic Wi-Fi cameras on line. These will likely work provided your marina has Wi-Fi

service. Alternatively, you could chose a more sophisticated, and expensive, system such as that offered by Maretron, which allows you to monitor the vessel visually via a cellular modem. Such a system could also incorporate an alarm that will text you should the vessel be entered, shore power disconnected, low battery voltage, high water alarm, or a variety of other events.

Hi Steve

If you recall from your inspection of my boat, you found my black water tank lid to be badly corroded. It turned out many of the SS drops under that lid were destroyed – perforated, separated or otherwise compromised.

So, we had to build a new lid. The head/plumbing company made the lid out of clear Lexan (something like ½-5/8” thick) and wants to use Marelon PVC fittings.

They say SS or other metals are just prone to corrosion in their experience. Obviously, SS is not the way to go, but I am not really too excited about being able to actually see into the holding tank! I also don’t like the idea of the plastic cracking!

Thoughts on these materials?

Paul Weismann

Paul:

I’d make the lid from minimum half inch GPO3, it’s essentially prefabricated fiberglass, very durable and unlike Lexan it’s both opaque and reinforced. Definitely not Lexan, no need, or desire, to see inside a holding tank. The lid material should be reinforced to prevent cracking around fasteners, and while Lexan is tough, it lacks reinforcement.

The folks who are doing the work are correct, metal should be avoided as it’s an extremely corrosive environment. PVC, schedule 80 (not schedule 40), could be used. Marelon is a proprietary product made by Forespar, it is glass reinforced nylon. However, none of its fittings are available in pipe thread, i.e. NPT, all are parallel or NPS thread, so it may not be suitable if they wish to connect pipe fittings to it. It’s essential that all pipe threads, here and elsewhere aboard the vessel, be compatible.

Steve,

I recently experienced a clogged fuel line upstream of the dual Racor 500MA’s. The boat, a 46 ft. mono-hull powered by a 75 hp Yanmar, had just crossed a lumpy Gulf Stream after a 1200 mile delivery from the Caribbean. The engine began to lose power until it wouldn’t turn more than 1000 rpm. After changing out the filters without an improvement, we spliced the genset fuel line over to the Yanmar and that set us going well again.

The next morning we found a clump of black fiber stuck in the ninety degree fitting connecting the primary fuel line to the dual Racor manifold. Problem solved.

Now I’m looking to install a crude (50 micron?) filter near the fuel tanks to prevent this from recurring but I can’t find a suitable unit. Racors roughest element is 30 micron. Any suggestions?

Dirk Lewis

Dirk:

While the problem you describe is rare, I have encountered it on at least one occasion, with the clog occurring in a similar location, at the selector valve for a tandem Racor assembly.

The offending material in my case was fibers left behind after a tank cleaning; those carrying out the cleaning used synthetic oil absorbent pads, which they wiped over the inside of the tank. These left behind filaments which accumulated in, and clogged the filter valve. It can be both disconcerting and dangerous. Installing a coarse strainer may help, however, it would have to be checked and cleaned as often as the primary and secondary fuel filters. It should be installed between the tank and the primary filter, a valve should already be present at the tank, in the supply line, enabling the fuel supply to be isolated when checking the strainer. The strainer should comply with ABYC H-33 standards, which primarily means it is designed for fuel use (and metallic), and capable of withstanding exposure to flame, without leaking fuel, for a minimum of 2.5 minutes.

You might find such a strainer by searching McMaster Carr Supply, using the words “standard strainers”.

Having said all that, such a clog is also indicative of the need to have the tank cleaned. I would, therefore, strongly recommend the tank be opened, inspected and cleaned if necessary.