­­­Red but Green

 RED BUT GREEN 2016 version

There is no reason when making passages for running an engine or generator to charge batteries. Use big modern wind generator when the wind is forward of abeam, a shaft generator when the wind is aft of abeam.

A bit of history follows.

The 46’ engineless yawl Iolaire built 1905 that the street family owned for 52 years was red but green. In 1974 the late Hugh Merewether had on his Nick 38 a small wind generator that he had designed and built. In 1975 we mounted it on Iolaire’s missen masthead and tested it on Iolaire’s 1975 double transatlantic. It was too small to provide all our light, but did provide most of it which we backed up by kerosene lamps. We did prove that Hugh had a viable commercial proposition if he developed the original.

He developed what became the Ampair wind generator, the first viable wind generator to be mounted on a yacht. Today there are half a dozen or move wind generators on the market with much bigger propellers and more advanced electrics/electronics. As long as wind is abeam, or forward of abeam they put out large quantities of electricity.

 But do not buy a wind generator unless the salesman will give you the name of three boats that have purchased the generator. This is essential as some wind generators produce so much noise as to be insufferable. Also the advertised wind vs amperage graph sometimes is rather optimistic to say the least.

On Iolaire’s 75 double transatlantic I realized the once the wind goes aft of abeam because the apparent wind drops off so does the amperage put out by the wind generator.

When Hugh replaced Iolaire’s original wind generator with the Ampair production model, I canabalized the original wind generator, attached an outboard prop to a 3 foot iron rod, attached to 50’ of ½ braided line, attached this to the cannibalized wind generator hung off the stern pulpit, and the taffrail generator was invented.

Ampair developed it to the point that it would put out 6 amps at 12 volts at 6 kts, 144 ampere hours as day.

Iolaire did five transatlantic passages with all electricity provided by ampair wind and water generators. They provided not only enough amperage for lights but also for two small electric refrigeration units.

This rig was developed for Iolaire as she was engineless.

Unbeknownst to me Hamilton Ferris on the west coast of the states also developed a similar water powered generator.

 Recently two water powered generators have come on the market Watts and Sea and Hydrogens. Both put out massive amounts of electricity from a small propeller. But they are expensive and easily damaged if they hit anything, If damaged at sea they are almost impossible to fix.

In contrast if the towed generator hits something or picks up a bit of a ghost net, the break link will break, you lose the prop and 50/60 ‘ of line but a smart skipper keeps a spare prop and line so is quickly back in business.

The Ampair and Hamillton Ferris generating units are pretty basic, maximum output about 7 amps at 12 volts. if the towed prop idea was matched up with the generating units of watts and sea or hydro gens whose amperage is produced by a small prop, it would be a fantastic unit that would produce enough amps for even the most hungry electrical system. It would be a unit which could be easily repaired at sea by replacing the towed prop and line if fouled and lost.

Had IolaIre had an engine we would not have experimented with wind and water towed generators we have gone to a shaft generator.

I noted in 1975 in Ocean Sailing Yacht vol 1 ,140,000 copies sold(copies still available via amazon) that the 36’ double ended Block Island ketch Lang Zyne sailed around the world in 1948/49 with all electricity provided by a generator belted off the free wheeling shaft. This generator provided enough amperage not only to provide lights, but also ran the auto pilot and refrigerator!!!!!

Note it was a generator, not an alternator, the refrigeration unit use much more amperage than a modern unit, the cork insulation was no where near as efficient and modern Freon filled urethane foam, and auto pilots in the 40’s and 50’s used huge quantities of electricity in comparison to modern units.

In my 1979 Ocean Sailing Yacht vol 2 40,000 copies sold again still available via Amazon, I noted the South African yacht Agwebe a 45’ sloop had a alternator running off a free wheeling shaft, prop18x10 that produced 30 amps at 5 kts..

Steve Dashew installed in a couple of his boats a wing shaft with a 12x18 prop driving an alternator that kicked in at low RPM’s an 80 lc electrodine. This is the type of Alternator that are used on delivery trucks. This produced 15 amps/12 volts at 7 kts, at 8 kts it produced between 25 and 30, more amperage than needed to run electrics, refer, deep freeze etc. There were two problems, at certain speeds the prop would cavitate and create a lot of noise, and when batteries were charged the shaft would be locked and there was the drag of the12 “ prop.

Steve was an American and did not realize that at that time Watermota had a small engine that was direct drive to an adjustable pitch prop that could be feather or pitch reversed. Had Steve installed the Watermota shaft, he would have had the perfect installation. The pitch could have been adjusted to give maximum amperage, once the batteries charged the prop feathered, no noise little drag.

On Lone Star a 56 ‘ ketch built by Mashford Bros Crymell Cornwall (immediately across the Tamar river from Plymouth)1984 I urged the installation of a shaft generator as a back up of the engine driven alternator and the independent generator. The designer did not like the idea, but it was installed and 32 years later is still working. It does not provide all the amperage needed but on passage cuts down the amount of time the generator has to be run.

Upon checking the installation in 2015 I realized that the alternator installed is relatively small . The tourque produced Lone Star’s 23” variable pitch prop is enough to run and alternator producing 40 to 50 amps at 12 volts. This would be more than enough to provide enough amperage for running all equipment including watermaker!!!!! Once the batteries were charged, the prop feathered to minimize drag

The manager of Royal London YC in Cowes told me that he had sailed he 60’ schooner around the world with almost all the amperage needed produced by a shaft driven alternator. He felt that if the electrician was more enthusiastic( but he admitted it is hard to get enthusiastic that requires a lot of time head down and ass up in the bilge) the unit would have produced all the amperage needed to run his 60’ schooner.

I have never been able to interest a yachting editor in publishing an article on the subject. They are only willing to do it when I come up with a successful tested installation that has a proven track record.

At this time shaft driven alternators are strictly a DIY project or projects.

Here us a little information that will help you work out an installation. Miles the long time skipper of Lone Star obtained a hand held tacometer(about £40) put a dot on Lone Star shaft and come up with the following figures in a no load conditons

Speed shaft rpm

6.3 301

7.6 366

8 390

This was on a 23” hunestadt variable pitch propeller. You can obtain a hand held tacometer, and do the same exercise on your shaft.

A rogugh rule of thumb, the trailed prop will spin at various speeds at approximately one half the rpm of the rpm’s needed to drive the boat at the same speed in calm water no wind.

Once you have figured out shaft rpm at a speed regularly achieved when on passage, locate an alternator that cuts in at low RPM. Check the cut in rpm of the alternator, cut in, your shaft speed at your passage speed, and figure the pulley sizes for the shaft and alternator.

For belts, from 1960 to 1972 Iolaire had an engine, a very unreliable 20 HP gasoline gray sea scout driving a folding prop via belt drive. After using the standard link belts that tended to stretch and had to be shortened we discover the best belts were the green ones with holes. Cut the belt to length and join with two metal plates and two screws Ocean sailing yacht vol 1 pg 462.

One word of warning, when the prop is freewheeling the blades have been flipped into reverse and it is pulling the shaft aft. Check with your gear box manufacturer. Will the gear box accept this reverse pull over a long period of time? Or should a thrust bearing be installed on the shaft to adsorb the reverse thrust.

Regarding prop, use a feathering prop that when put in reverse will lock in reverse. Start the engine, put it in reverse, then neutral, prop will free wheel driving the alternator, shut engine down. Once batteries are charged, put the engine in gear, in ahead, then hit the starter, prop blades will flip to drive ahead but since the engine did not start, and it is in gear, the blades will feather.

Looking at the difference in cost between the normal alternator, and the fully marinized one I would recommend buying two normal alternators. When the first one starts giving trouble remove and discard it and install the replacement.

Install a feather prop. The difference in drag between a feathering and folding is infinitesimal. On a feathering prop, when put in reverse, the blades flip so the proper side of the blade is working increasing backing power to between 50 and75% over a sold or folding prop.

Put the engine in reverse, then neutral, prop locked in reverse, charge batteries. Once batteries charged his the starter button with the engine in ahead, prop will unlock and since engine not running will feather.

As state in the beginning of this section, when on passage , there is absolutely no reason to run an engine or generator to charge batteries.

A good wind generator will produce all or most of the amperage needed when the wind is forward of abeam. When the wind goes aft of abeam the shaft generator will produce all the amperage needed.

There are three sailors in the world who could do yachting a huge favour and do their bit no minimise global warming. Mark Turner, the new head of the Volvo Round the world race, Sir Robin Knox Johnson with his clipper race. In both races the boats are one design. If the boats had to generate all their electricity by using shaft generators, with the amount of R and D money available to the individual teams, they would rapidly develop really efficient shaft generators.

The third person who could spear head the effort to develop really good shaft generators is Andrew Bishop. If he gave a substantial prize for the first boat on corrected time that did the entire race/passage generating ALL their electrical needs by water generation(wind generators very inefficient going down wind in the trade) all sorts of DIY shaft generators would evolve.

If all the above is done I am sure that five years down the line, off the shelf shaft generators would become available. If this were to happen, I am sure that on passage very few yachts would be running their engines to generate. Boats would use shaft generators when sailing down wind and close reaching, wind generators when beating to windward.

Sailors would be doing their little bit to minimize global warming and sailing would be more pleasant with no generator noise or exhaust fumes to smell