

How to go fast in a Melges 24 — Tips from the Gold Cup

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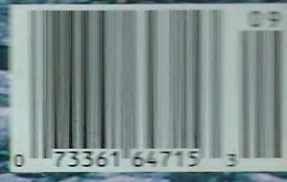
SAILING WORLD

The Authority on Performance Sailing

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Work your boat to catch the waves

by Ed Adams





Wave Dancing

Whether you're sailing a dinghy or a keelboat, the only way to catch and escape from waves is through choreographed movements of crew and helm.

By Ed Adams,
Onne Van Der Wal photos

"I am Torben. I am Torben." This is my mantra whenever I face a heavy air reach. Torben Grael, the Brazilian multi-world champion, can blow over or under any other boat on the racecourse. His only competition is the waves. "I am not a pasty-skinned gringo," I say to myself. "I can samba. I am Torben."

Grael is my offwind idol. Like so many champions from South America, his downwind speed is legendary. The "Yanquis" from "El Norte" worry about upwind speed, measured in tenths of a knot. The sailors from the other hemisphere focus on real speed; the speed that comes from riding waves. They have learned how to master the rodeo of offwind sailing with the skill of a gaucho. They will sail 50 percent more distance chasing, riding and escaping from waves, but in doing so they will sail 100 percent faster.

Sailors like Grael can make up hundreds of yards on a heavy-air reach. They can round

the weather mark in 10th and be out of sight by the leeward mark. They do it by attacking the waves with purpose, by looking forward and sideways, but never looking back. They do it with carefully choreographed crewwork and precise steering. It takes 100 percent concentration; that's the reason for my mantra. It takes hours and hours of practice, until the samba becomes second nature. And it takes an understanding of how waves work, and how you can make them work for you.

How Waves Work

First, let's talk about waves. We all put a great deal of effort into trying to milk every electron of energy from the wind. Our sails are trimmed to catch the force of the wind and convert it into thrust. But the wind does more than lift the leaves off the driveway, it also lifts the water into waves. Those waves absorb and carry some of the wind's energy, and if you want to win offwind legs, you need to

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Next wave

Reach
across
the face

To catch a wave, first match its speed by reaching up and sailing parallel to the wave face. Scan the water ahead and to windward looking for a steep part of the crest.

know when and how to tap into that power source.

A wave is born wherever an onshore wind forms, or where an offshore wind first touches the water. From its beginnings as a ripple, a wave will grow in height, length and speed as long as the wind continues to feed it energy. A wave has to grow to a substantial size before it moves faster than your boat. Ask yourself, "Is the wave moving faster than I could sail with this much wind in flat water?"

If the wave is faster, it's time to put on those dancing shoes. When the wave is moving slower than your flat-water speed, you still need some fancy footwork to make use of its energy. For example, after a couple of hours in a steady, 10-knot breeze, a wave might grow to nearly a foot high and 10 feet long between crests. In a 20-knot breeze that same wave could grow to 3 feet high and 40 feet in length. With constant wind, each wave would continue to grow in both height and length, and become proportionately longer as it ages.

As a wave becomes longer, it also becomes faster. For a given length between crests, a wave will roll at a speed that is approximately equal to the hull speed of a boat of similar length. For example, a wave that is 40 feet long will roll at just over 8 knots. If you are sailing a 40-foot, non-planing boat, the wave would be moving at your hull speed.

Suppose that the wave is 50 feet long. In this case it could carry you, dead downwind and locked into its trough, at a velocity faster than your hull speed. If the wave were only 30 feet long, it could become a trap, preventing you from reaching hull speed — with short

2Head
down
sharplySteep part
of the face

When the boat is poised on a steep crest, hike the boat to weather and head down sharply. When the bow lifts clear of the water, the crew begins to slide forward.

waves, a boat can get stuck in the troughs, unable to muster the force needed to climb over the next crest.

Most of us have experienced this after rounding the weather mark in an offshore breeze. As you sail dead downwind, near shore, you encounter smallish waves that only cause control problems. Later, by the leeward mark, the waves become surfable and the leaders surge ahead. When the boat is a lightweight dinghy, many waves become potential traps as soon as there is enough wind to plane.

If waves are such potential traps, why is so much effort devoted to learning how to surf them? Wouldn't it be better to avoid all waves except those large, long, fast ones found well offshore? The answer to these questions is twofold.

How to Wave-Ride on a Reach

First, it is usually impossible to "avoid all waves." Second, the whole relationship between your boat and the waves changes as soon as you head up from dead downwind. When you turn to reach across the wave (and free your mind from rhumbline mentality), the magic performed by sailors like Torben Grael becomes possible. The lesson here is to never sail dead downwind when running in waves; for that matter, you don't want to sail the straight line on a reaching leg either. Remember how to do the samba: sail 50 percent more distance; go 100 percent faster.

How To Ride Waves

Let's assume that you haven't learned to samba yet. Instead, you point the boat straight downwind, straight at the mark. The boat is



Use It...

or Lose It

When "hanging 10" on the crest of a wave, the crew must slide forward to depress the bow and force the boat downhill. If the crew stays aft, the boat slides backward off the wave. Result: you're one wave behind where you started.



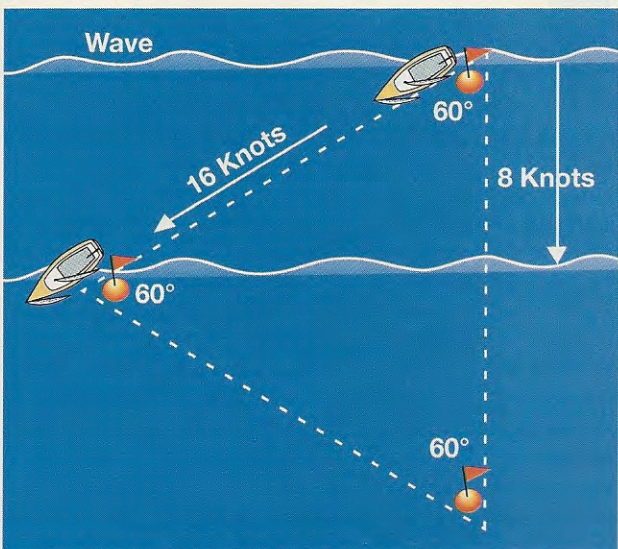
Move to the foredeck to press the bow down a wave face. This does not violate the rule against ooching if the motion is smooth, and you don't grab the deck or stop abruptly.

self in the back of the next wave. Maybe you'll get lucky, become trapped in the trough, and be carried along by the wave at 8 knots. It's more likely, however, that the boat's deceleration in the trough will cause the wave you just rode to overtake and pass you. The result is the same as in the first scenario; the boat is left one wave behind where it started.

So the goal downwind is more complex than simply surfing the waves. The goal is also to avoid falling behind each set of waves. When you learn how to samba, the goal becomes more lofty — to pass waves. Here's how.

First, let's imagine that you head up from the rhumbline. It doesn't matter if you are reaching or running; if you head up, the boat will accelerate. If the wave is rolling downwind at 8 knots, and you head up prior to its arrival, good things happen. First, you will probably be able to match the speed of the wave. And as the wave arrives, you will be traveling across its face, on a course intersecting the oncoming crest. This means the weight of the boat won't distort the face of the wave.

As you reach across the face, scan the water ahead, looking for a particularly steep part of the wave face. When the boat reaches that steep section, bear off. With your extra speed, chances are you will catch the wave and go surfing down its face at, say, 14 knots. But you're still faced with the problem of what to do when you reach the trough, "the bottom of the hill." The solution is to head back up prior to reaching the trough, so the boat will maintain its speed. Then it will reach along the wave face, always sailing slightly downhill, at nearly 12 knots.



A boat that stays on the same wave face will cover twice the distance at a 60° angle off dead downwind.

sailing along at hull speed; let's call it 6 knots. Then a wave moving at 8 knots comes along and begins to pass under the boat. If you just sit there passively, the boat will strain to catch the wave. But as it sits poised on the crest, the sheer weight of the boat "squashes" the crest. Before the wave can hurl your boat downhill, it first must survive this suffocation.

If the wave "dies," the boat slides back, and is left one wave behind where it started. If your boat catches the wave, it will begin to surf downhill at, say, 10 knots. But if you continue to sail straight downhill, the bow will eventually reach the trough and bury it-



Wall of the next wave

Turn up to avoid the trough

Head for the low spot



Oops!
Don't plant the bow

After riding down the face, it's essential to head up before you reach the trough. If you don't, you will run into the next wave, bury the bow, and stop the boat. The crew must move aft and to leeward to assist the turn. Always be on the lookout for a low spot in the wave ahead — steer for it, and if you're going fast enough you can jump over that wave and catch another ride.

Consider this: if the wave is traveling at 8 knots, dead downwind, and you have enough wind to sail at a 45-degree angle along the wave face, the boat will automatically move at about 150 percent of the wave's speed — or roughly 12 knots. Head up to 60 degrees and the boatspeed doubles, to 16 knots (see diagram, previous page). Regardless of what speed you sail, remember that as long as you are locked onto the wave, you will be carried dead downwind at 8 knots.

The ability to get the boat "ripping" across the face is a potent weapon in your war with the waves. On a reaching leg, use this extra speed to sail to the steepest part of the wave.

Then bear off radically and ride down the face. You have to turn nearly perpendicular to the wave to acquire the full push of the wave crest; on a reach that turn might be as much as 60 degrees.

Once you are screaming down the wave face you have to turn back up before you reach the trough. This is where 90 percent of all novice samba dancers trip on their feet: They wait a fraction of second too long to head back up.

If the leg is a tight reach, go for mini-rides just to boost the boatspeed. Every time you "pop" the boat off a crest, the speed jumps. On broader reaches, push for longer rides and

try to work below rhumbline. Then you can reach back up, sailing all the faster, on your approach to the reach mark.

On a running leg, the primary goal shifts from pure speed to advancing through the wave sets. When sailing a keelboat, it's the boat that loses the fewest wave sets that wins the leg. With a planing dinghy, it's the boat that advances the most wave sets that comes out ahead. Take our sample, 40-foot long wave. A sailor like Torben Grael can advance four sets on a run, while a lesser sailor might lose four sets. That translates into a 100-yard loss for those who can't samba. And an amount of upwind speed will make up for that kind of loss.

Just as on the reaching leg, first build speed by sailing across the wave face. Sailors in unstayed dingies like Lasers have the advantage in that they can sail across the wave face in either direction without jibing — for them, sail



ing by the lee is just as fast as sailing on a broad reach. While the angle you sail across the wave face is not as radical as it is on a reaching leg, it's important to have enough angle to keep the boatspeed up and the wave face virgin.

Once again, the first step is to scan sideways along the wave, searching for a steeper part. When you reach the chosen point, turn down hard, perpendicular to the wave. Before you reach the trough, remember the prime directive: "thou shalt not decelerate." So head back up before it's too late. If the trough is shallow, and if you see a low spot in the wave ahead, consider trying to jump a set. This takes speed and inertia. If you have it, aim straight for the low part and pray. It's a big "gainer" if you break through the wave ahead; but if you miss, the loss of inertia will often cause the original wave to overtake you and roll past.

Steering and Kinetics

Mastering the art of downwind sailing takes precise steering, body movement and sail trim. A top sailor will expend just as much physical energy reaching in waves as when power hiking upwind.

The first rule is to steer the boat with crew weight. Using the rudder only creates drag

that slows the boat. That said, the second rule is to never compromise the placement of the boat for fear of using the helm. In other words, try to steer with crew weight, but if it's not enough, by all means use the rudder. When you do use the rudder, it's better to steer with short, hard jabs and tugs, rather than with prolonged pulls.

The crew heels the boat to assist steering. If you heel to weather, the underwater profile of the hull becomes asymmetrical and the boat bears off. Heel to leeward and the boat heads up. Crew weight is also used to trim the boat. A boat surfs and planes best when it is trimmed with the bow slightly up. But dragging the stern is just as slow as burying the bow. So the crew has to watch the height of the bow off the water. When there is air under the bow, move forward; when the bow drops into the water, move aft. These fore-and-aft motions can be quite aggressive, as long as the crew doesn't ooch the boat by stopping abruptly.

In big waves a crew might slide from the foredeck, as the boat drops off the wave face, to the afterdeck, as the boat careens into the trough. In the accompanying photos, study how the crew travels in a circuit. First, she starts aft and fully hiked, then moves to the bow to press down the wave, leans in and aft

The hardest part of wave riding is escaping the trough. Most sailors head up a fraction of a second too late. If you do it right, you will emerge ripping across the wave face, ready for your next big ride.

as the boat plummets into the trough, and comes back up the rail as the boat returns to reaching across the wave.

The final part of this kinetic dance is pumping the sails. There are two key points here. First, the sail must be pumped with a short, powerful stroke. What counts is not how much you pull, but how hard you pull. Long, leisurely trims only serve to stall the sails. Second, you need to pump when the sail is loaded the hardest. As you make your turn down the wave, the sail loads from the rotational force — that's the time you want to pump.

Going fast upwind is a matter of how precisely you tune the rig. Going fast downwind is a matter of how in tune you are with your boat and the waves — timing is everything; you have to hear the music to samba like Torben.

Senior Editor (At Large), Ed Adams is a past champion in the Laser, Snipe and Star, and currently a coach for the US Sailing Team. For further reading on the subject he recommends High Performance Sailing, by Frank Bethwaite, published by McGraw-Hill.