HOW TO AVOID MAKING A WRONG TURN

An easy way to determine your boat's turning characteristics.

By Tom Collins

Doing predictions for a log race involves computing the predicted leg times based on your boats performance characteristics. The most important is speed. Probably the second most important is turn time. (There are a couple of other minor factors I'll cover in a future article.) This article will describe how to easily and accurately determine a boat's turn characteristics using a technique that wasn't available a few years ago.

To begin, you'll need to have aboard both a GPS and a computer running Coastal Explorer. You'll be making some turns while recording the actual track using Coastal Explorer. Start by coupling the GPS to the computer so that the boat's position is shown. Right click with the cursor positioned on your boat's symbol and then left click "Enable Tracking" if it is not already check marked.

Now it's time to get underway. As the boat starts moving you'll see the actual track line extending behind its symbol. Place the cursor on the track, right click then left click "Properties" in the pop-up box. On the right side of the screen will be the track properties. Under the heading Tracking, click to check "By Time Interval" and enter 1 sec in the Time Interval box. Uncheck "By Distance Interval" and "By Course Change". Now the track will consist of a dot placed every second.

Go to an area of relatively calm water where you can make a number of circles without the need to adjust for traffic or other hazards. Set the RPM to that normally used for racing and then place the boat into a "Standard" turn. This will either be a predetermined rotation of the helm, or a value on the rudder angle indicator. Don't readjust the throttles; leave them as set before entering the turn. Once the boat's turn rate is established use a stopwatch to time full 360-degree turns by marking repeated passages of any cardinal point on the compass. Typically a reasonable turn time is thirty to forty seconds for a 180 turn so the stopwatch should read sixty to eighty seconds for a full 360 turn. Make any helm adjustment necessary to establish this rate and make two or more turns at this rate.

The track on the Coastal Explorer display should show some very nice circles. You may have to zoom the display to see them well. They may take the form of a spiral if the boat was influenced by wind or current. (Incidentally, this is an interesting method for measuring the effect of wind and current by analyzing the spiral offset.) To measure the diameter of the track circles, click the boundary circle symbol (circle with an enclosed X) just above the center of the chart display and then position the cursor approximately in the center of the track circles and left click again. This will display a quarter-mile circle. Adjust the size of the circle by left clicking anywhere on the circle and dragging it to the size of the track circles. If the display is cluttered with chart markings, select the Tool (wrench) symbol at the lower left of the display and click on "Hide All Charts". The position of the boundary circle can be adjusted by dragging the center point of the circle.

Once the circle has been accurately positioned over the track circles, the radius of the boundary circle can be read from the properties box on the right under the Range tab. This is the value that should be entered into Coastal Explorer Main Menu>Configure Vessel and Electronics>Vessel>Performance Characteristics>Turn Radius. This procedure should be repeated for both port and starboard turns. You may find there are different values for each. This is expected for single screw boats. For twin screws a substantial difference may be due to an improperly calibrated rudder angle indicator, inaccurate tachometers, different reduction ratios, or different propeller sizes. In such event you may choose to try to correct the error, use different port and starboard turn rudder angles, or simply enter the different turn radius for port and starboard turns into Coastal Explorer.

You have now very accurately established your turn time and turn radius. Do note that there are other factors that affect turn times that we have not yet addressed. Two of them are delay and slowdown.

Delay is the time it takes from the exact moment the mark is passed until the helm has been swung and the vessel has actually begun turning. Compensate for this by anticipating the mark passage and actually initiating the turn a couple of seconds early.

Slowdown is the loss of speed while the vessel is turning. This value can easily be determined from the data just taken. Calculate the circumference of the turn by multiplying the radius by 6.28 and then calculate the speed in the turn using the circumference and turn time. For my boat the speed in the turn is about six percent slower than my baseline speed. Not much, but nevertheless something that could be compensated for. If you want to correct for slowdown, compute the extra time in seconds it takes your vessel to travel through the distance of a ninety-degree turn due to slowdown. For my boat this value is 1.4 seconds per ninety degrees. So for a 130-degree turn the time lost due to slowdown would be two seconds. To be absolutely precise, this time could be added as leg layover time when doing the predictions in Coastal Explorer.

Another turning error is skid. Skid is just that, the amount the vessel slides sideways during a turn. Sailboats with their very large keels have very little skid, but planing boats with minimal keels skid quite a bit. Skid is only significant in turns substantially greater than ninety degrees. Skid is best determined empirically by making 180-degree turns on a set of range markers and comparing the actual time with that given by the predictions. Time lost due to skid can be accounted for by entering an offsetting value to the layover time for the leg.

Once you have done your predictions using Coastal Explorer, leave the track set to the one-second precision and record your track as you run a course predicted using CE. Be sure the waypoint style is set to Predicted Log Race. Then examine your actual track to see that it actually overlays the route. I had to refine my early turn to overcome delay. I turn on the call of “Set” as in “Ready, Set, Mark”. My track now overlays the prediction perfectly.

Using Coastal Explorer to accurately determine a vessels turning characteristics plus using the Predicted Log Race feature of CE to predict turns brings a significant improvement to the “wet finger in the air” techniques used previously. Good Luck!