

# ***Propellers - The real business end of R/C Hydros***

*by Don Mock*

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No matter how well an R/C Unlimiteds racer is prepared, (having a powerful engine, perfect hull set up, great driving skill, etc.), without the right propeller combination, the winners circle will be difficult to reach. Just like in the full size unlimiteds, propellers are one of the most significant elements to success on the race course. For scale hydro racers, it can sometimes be difficult finding the right prop for their particular boat and for the various conditions.

A surprising number of model boat racing propellers are available from companies, like Octura and Prather. Costing about \$15.00 each, props come in two and three-blade versions with various pitch and diameters cast out of beryllium copper, brass or stainless steel. Racers must balance and sharpen new props to get optimum performance. Since many of the factory props are proven winners, most drivers race the props stock. However, some modify their props in various ways like re-pitching or cupping the blades. There are a lot of variables that play a role in a prop's performance. One principal element is the hydroplane's hull. Weight is an obvious factor, but how the boat rides or "flies" on the water also determines the best prop selection. Boats that are heavier than average might still be able to use props reserved for lighter boats if, at speed, the hull rides light on the water. The opposite is true for light boats that ride "hard," making them difficult to push across the water. Weather and altitude also play large roles in the choice of props. Engines develop less horsepower in warm weather and at higher elevations. On the R/CU race circuit, for example, Spokane, with it's higher elevation, or the hot weather in Tri-Cities can send racers running to their tool boxes for smaller props. It's interesting to note that most model boat straightway records have been set in the winter months or on cool days.

Another aspect of weather that effects prop selection is wind and waves. Racers will often "prop down" when faced with rough water conditions. With a smaller prop, the boat can race at a safe and slow speed and still maintain engine RPM. Traveling slow in rough water with large props risk bogging down or even killing the engine.

One important characteristic propellers possess is "lift". On hydroplanes, the prop not only pushes the boat forward but also lifts the transom out of the water. Thus, the term "prop rider". The prop literally pushes itself half-way out of the water and, in conjunction with the sponsons, supports the boat on it's cushion of air. Lose a prop at high speed and the transom drops sending the bow skyward into a likely "blow over". Scale hydro racers choose props that generate the correct amount of lift for their hull. Three blade props have a tendency to create more lift than a two blade and when a boat experiences too much prop lift it can

ride too hard on it's sponsons causing loss of speed. The depth and the attack angle of the prop can be modified on scale hydros by adjusting the strut ,which supports the prop shaft. There are two more basic approaches used by scale hydro racers to select props. One is to use the largest prop that the engine can turn. This usually means the driver will lengthen the tuned pipe in the boat allowing the engine to develop more torque with lower RPMs. This set up can supply a lot of power and straightway speed but may not be a quick accelerator out of turns. The other approach is to use a smaller prop with a shorter tuned pipe length allowing the engine to whined up more RPMs but with less horsepower. This set-up can make a hydro accelerate quickly, due to less load on the engine, and help keep the power up in the turns. Sacrificed top end speed is often the down side of this combination. Most racers find themselves balancing out these concepts, striving to hit on that magic formula that works best for their particular hull, engine and driving style. In the end, spending a day at the lake, testing different propellers, strut settings and tuned pipe lengths is the only true way to find the best combination that can put an R/C Unlimiteds racer in the winner's circle.

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