# DRAG PERFORMANCE ADDENDUM

Since this article series was written, I have had the time to do more in-water tests to better define the impact of equipment configuration choices. The drag of a freediver with mask, fins, wetsuit and weightbelt is the baseline for the comparisons. This diver, swimming with arms at side and looking forward in a standard recreational swimming posture, is the normalized baseline with a drag coeficient defined as 1.0.

This baseline was compared against the experimental streamlined kit from Part 3; a DiveRite Transpack 2 harness without a BC wing, configured with a 48" hose on a single regulator with the hose routed in a low drag configuration as shown in part 4 under "Equipment Considerations"; and an OMS backplate and wing (BP/Wing) with a single regulator on a standard length hose. The OMS wing is a 45 pound lift wing, banded to tuck it in as small as possible when deflated, and it was completely deflated and at neutral buoyancy for the test.

All scuba configurations used a standard AL80 scuba tank and a tank pressure gauge mounted on a high pressure hose tucked cleanly into the harness. Octopuss regulators were not used and would add additional drag beyond what was measured in these tests.

Normalizing the data to that of the freediver, here is how the drag coefficients (Cd)s breaks down:

Cd Freediver = 1.0
Cd Diver with Al80 in experimental streamlined kit = 1.15
Cd Diver with Al80 in DR Harness with no BC = 1.6
Cd Diver with Al80 in OMS BP/Wing = 2.0

As a kit and compared to the OMS BP/Wing:
Ditching the wing cuts the drag of the scuba kit by 40%.
The streamlined kit cuts the drag of the scuba kit by 85%

For the whole diver system:
Ditching the BCD wing saves 20% in total diver drag.
Using the experimental streamlined kit saves over 40% in total diver drag.

For a typical diver, adding scuba equipment doubles their drag in water. Adding more equipment will increase it further still. Contemporary scuba divers are basically swimming for two, but as has been shown here, that does not need to be the case. The lack of industry focus on streamlining scuba equipment is forcing divers to work harder underwater than necessary. Streamlining gear works and can make a really big difference in the overall diver's performance, level of relaxation and efficiency of air use. The pursuit of better hydrodynamics for scuba divers should be the next big industry priority for equipment manufacturers.

I have measured a solid 2.9 knots in sprint performance tests with this streamlined kit. This is on par with the maximum performance of high-end DPV systems, and this is accomplished without heavy and expensive batteries.

Another development: While the experimental streamline kit does not have a BC, I now know how a BC can be incorporated into the design without adding any drag to the system. I don't know if I will build this system, but I'm sure that I could do it if I wanted to. This would likely be a necessary step to move forward with commercializing this technology for recreational diving.