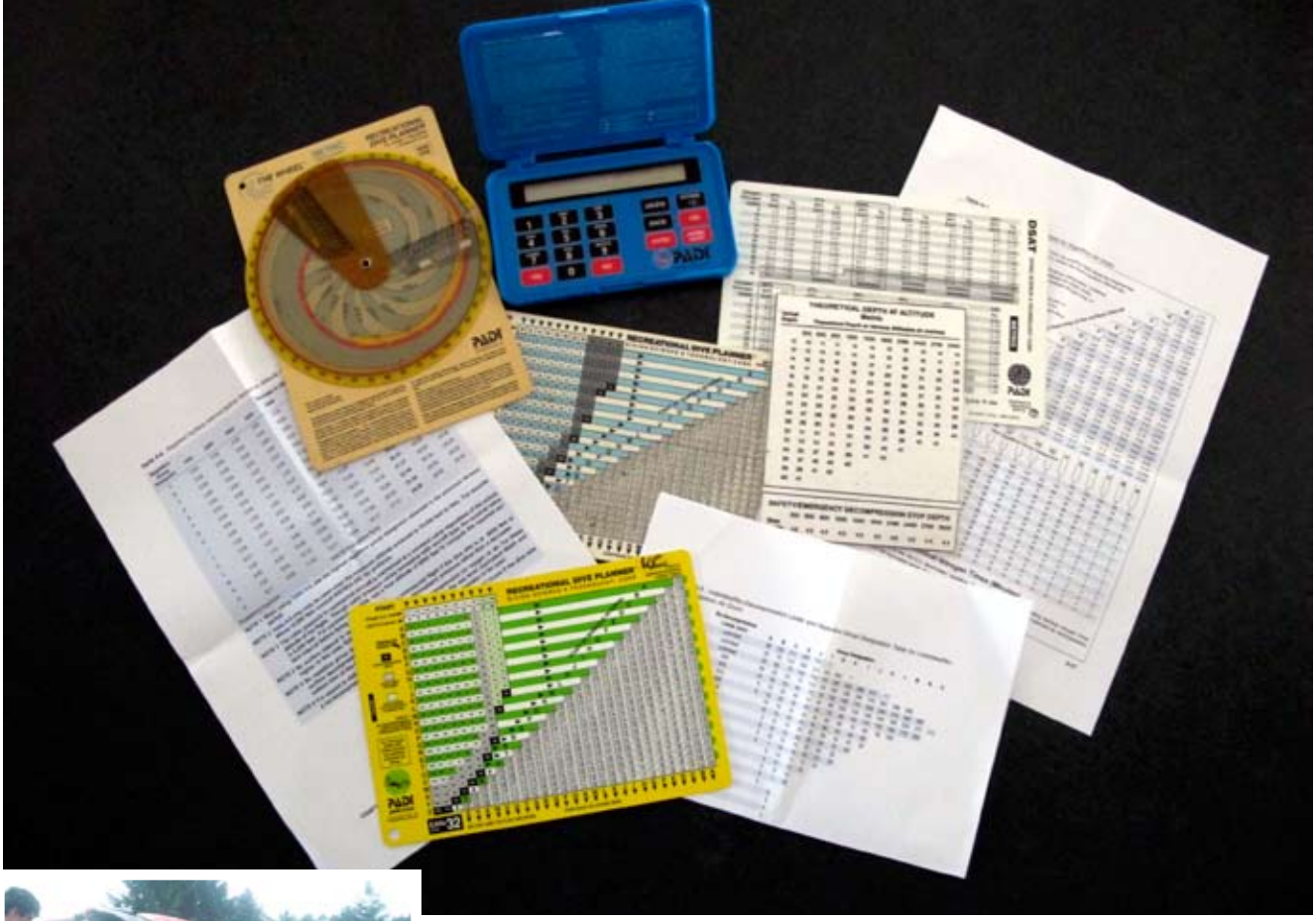


Dive Tables and Computers

Limits and targets, rules and predispositions, a set of ¾" bolts and a game to play.

by Keith Cardwell, wwwfnqdive.com.au

They're Limits Not Targets

It aggravates me when drivers hurtle out of nowhere and snuggle up to the rear of my car with the intention of getting me to either increase to their idiot speed or pull over. I pull over a lot. Just what are these drivers thinking? (*'My reflexes are so sharp, I can react pretty damn quick and avoid hitting you?'*) Whether it's an old Holden Ute or a late model Porsche, neither will be able to avoid the consequences of defying basic laws of motion. Speed kills and we can't react quickly enough regardless of what we drive. The mass of a moving body requires more than its braking system to stop its momentum from carrying it on.

An Analogy

When teaching diving we use the driving/diving analogy a lot and although mercifully infrequent, going beyond acceptable diving limits and having a dive 'crash' can see results ranging from a temporary inconvenience/embarrassment to the downright horrible.

We all know as divers that one of the consequences of breaking our depth/time limits can result in decompression sickness in one or a variety forms. However, similar to the driver and the car driven, it really doesn't matter what dive table or clever computational gadget the diver uses, accidents will occur if basic avoidance measures aren't taken. We all know there are a variety of dive tables and an endless array of computers to help us. But which is best? The arguments abound. So what dive tables and/or computers should we use?

Dive Tables

When I first learned to dive the most common argument from 'expert divers' at club meetings was that we had to have dive tables for recreational divers - not military tables like the US Navy Tables which we used then. These were, after all, designed for fitter individuals with set dive profiles to follow. And so the debate raged...About a decade later (early

1980s) PADI created the Recreational Dive Planner (RDP) to answer this concern with quite a few benefits over other dive tables. A couple of these were allowing shorter surface intervals between dives and the ability to plan multi-level dives and in the knowledge that all profiles had been empirically tested. I freely admit that the 'Wheel' version of their RDP was often a pain to defend when sometimes, through variation in manufacturing tolerances different 'Wheels' gave different results, albeit small. However, in the latest evolution of the RDP, the eRDP, this argument is fairly much voided.

Other dive tables are out there that may claim greater accuracy but are any of them really so or as accurate as computers claim to be?

Computers

The first computer I used was bulky with a manual as huge as a 17th century Bible. Today, dive computers can still be relatively bulky for the ones that do everything but make you coffee, but many are small enough to be worn and adjusted like a conventional digital wristwatch.

Without doubt there are plenty of computers from which to choose and it can be quite confusing, especially when using abstract paragraphs that extol the virtues of the algorithms and models used. I'm still fascinated in the theories and models used to describe the uptake and out-gassing of the stuff that can cause those diving crashes but there's no time to discuss such things as the Buhlman, Variable Permeability or Reduced Gradient Bubble models explaining the reasons why some computers vary from others. For those who wish to get wrapped up in these comparisons, get web surfing!

Just like the earlier dive table critics, there are quite a few verbal punch-ups to be had in comparing computers. But doesn't it really all boil down to something a little simpler?

A Set of ¾" Bolts

In my final year of engineering study, I was told a story by one of my lecturers that stuck with me as a classic tale of practice versus theory. In one of the papers he marked, an adult student had fumbled his formulae and couldn't quite get the problem out. What he did do was to make the bald statement that he knew he'd blundered with his number-crunching but from his experience and common sense, he would use a set of four ¾ " bolts. That answer was enough to solve the problem and do the job.

Perhaps we can look at both dive tables and computers in a similar way. We might not be able to sort out the problem of exactly what's best for us but something that comes fairly close might just do if we apply common sense and take good advice. Although this might be taken as a shocking admission, I confess to considering the best use of dive tables for the majority of recreational divers as a wear-resistant and colourful beer mat.

Many new divers will forget dive table calculations the minute they leave the classroom and, when on holiday, will trust the Divemaster in charge of their dives to give them guidance as to how long and how deep to dive and how long to have lunch to let the nitrogen fizz out. Others who become more enthusiastic, adventurous and decide to make diving one of their main sports will probably buy a computer fairly soon. Then the dive tables will again become a drinking accessory. With these thoughts in mind, just how should we approach these issues?

Rules and Predispositions

Many of the general rules relating to the use of dive tables are usually printed on the same plastic, waterproof charts readily available to the diver. These rules often cover safety stops required, flying after diving, diving at altitude, speed of ascents and what to do if planning multiple dives during a single or several days. Not a bad idea to review these sometime, maybe on the trip to the dive site. Number-crunching may not be your strong suit but the other hints to avoid decompression sickness may certainly help.

Apart from these general considerations, there are other constraints that may relate to us specifically.

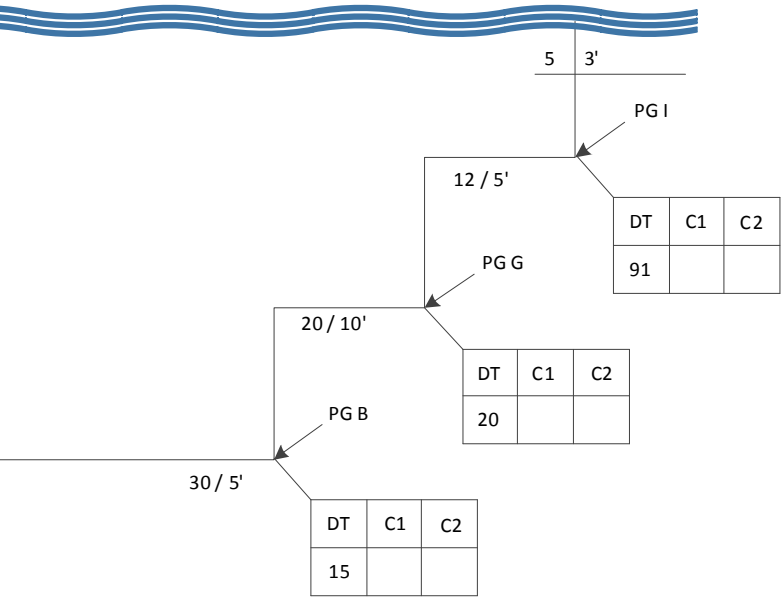
Those that may affect us are often listed as: obesity, age, poor respiratory or vascular function, alcohol, dehydration, recent illness or injury, cold, exercise and smoking.

So, for those middle aged old farts who are still, sadly, drug addicts (smokers) and who enjoy more than the 'occasional' beer the night before the dive, they may start off the day dehydrated, slightly hypoxic

(because of the affinity carbon monoxide has with the stuff usually reserved for oxygen transport) and on this basis alone, are already handicapped regarding how much time there is allowed at whatever depth chosen. Middle-aged old farts usually have a constant fight with their ever increasing fat payload. So - the older the diver, the more concern about real limits and not just what tables or gadgets tell us. That doesn't mean if you're young you can assume that normal limit pushing is okay! Some divers have become bent doing the lightest of dives and nowhere near prescribed limits.

So how can we tell what is the most conservative method to use and how does our computer really compare with the table we prefer (if any)?

DIVE TABLE V COMPUTERS 1 & 2



not to scale
DT = Dive Table eRDP this example
C1, C2 = Computers 1 & 2

A Game to Play

A good exercise which will be of interest to many is using the following tool:

Using a slate, plot out a multi-level profile and, sticking strictly to depth and time limits, compare how your dive table stacks up against yours and your buddy's computer. Best comparisons are when you use different computers but it's surprising how even a fraction of a metre difference in diving depths makes for differing time limits even with similar computers. The message is quite clear when done. Limits are variable for many reasons other than just the physiological differences of each individual diver.

Computers, because they give a constant averaging of values during the dive will nearly always offer longer time limits than indicated by any dive table. This is all well and good but no-one has yet come up with a simple model for us to apply to these results to modify them if we have any or all of the predisposing factors mentioned earlier. Keeping well clear of any indicated limit is just a smart thing to do.

This diving test may also give us a good method for comparing before purchase. Check out your dive shop - they may offer a try before buy policy.

Coming to a Halt

It really doesn't matter what car we drive, the laws of physics tell us that travelling too fast and too close to another moving object is inviting disaster if the person in front decides to brake quickly. We just aren't as quick or unbreakable as some of us would like to believe. Similarly, we can keep on arguing about dive tables, the algorithms they were designed from, the functions and features of any one of dozens of computers, how much greater are the limits this or that gadget will allow, but it all boils down to the simplicity of not treating limits as targets and take considerably more care if possessing any predisposing factor/s that may increase our risk.

For those who wish to obtain more knowledge on this subject, I'd strongly recommend getting the 2nd edition of Deeper into Diving by John Lippmann and Dr Simon Mitchell and become a member of Divers Alert Network (DAN). As a DAN member you receive a regular edition of the Alert Diver that frequently updates issues specifically related to decompression issues.

Limits are NOT Targets.

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