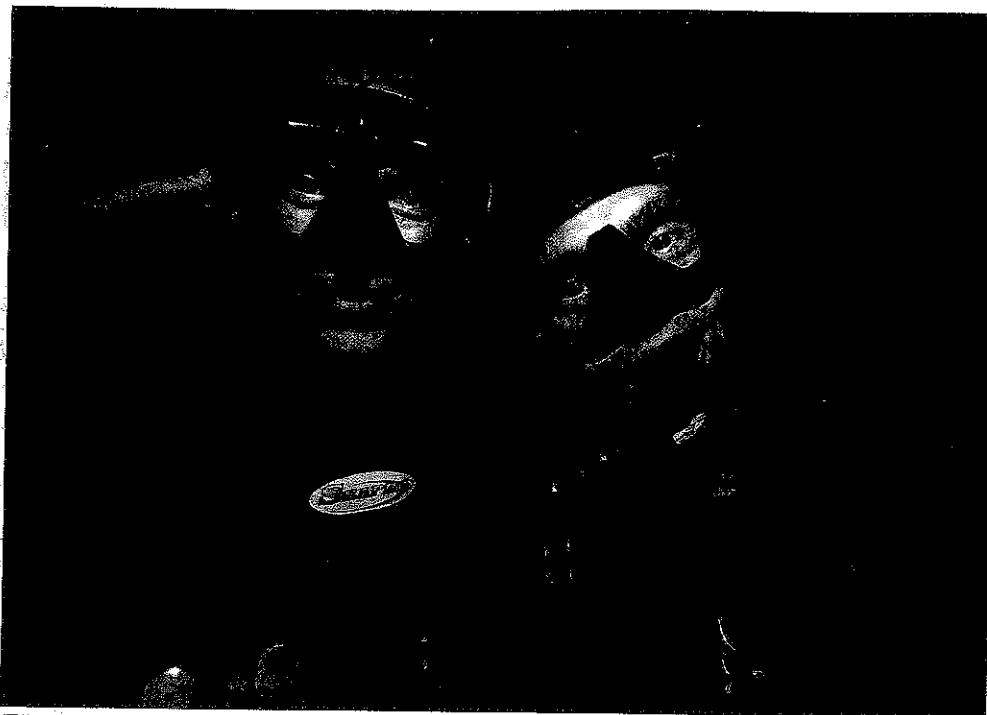


Staying Afloat

We Examine BCD Problems



JEZ TRYNER / IMAGEQUESTMARINE.COM

Besides the regulator, perhaps the most critical item of dive equipment is the buoyancy compensation device. Designed to allow the diver to control his buoyancy throughout the dive, these devices are relatively complex, incorporating a large number of individual components and moving parts.

Despite this fact, it is easy to take a modern BCD for granted; it seems to operate flawlessly most of the time. Still, divers do sometimes experience problems that hasten them back to reality. That might

include stuck inflator valves or the inability to inflate or deflate the device when a quick change in buoyancy is needed. The result can be rapid ascent or a serious sinking situation.

To get a better handle on the types of BCDs used and the problems experienced by divers, the Scuba STAR Network conducted a safety survey on the subject in February and March of this year. Here we examine preliminary results of that survey and learn some important lessons from that analysis.

BY RICK LAYTON

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A surprising number of BCD designs are available today; they incorporate a variety of basic functions and features. Responding divers equally split on their style preference: Some usually wear a jacket-style device, and others wear a back-mounted or "wings" design.

Sixty percent of the respondents reported that their BCDs are of a weight-integrated design, and 56 percent reported that they are equipped with an integrated air inflator as an alternate air source. Surprisingly, around 40 percent of respondents reported that their BCDs are not equipped with auto-inflators. While this may be accurate, it is also possible that some respondents may have been confused by the wording of the survey questions. The average age of the BCD used was about 4-1/2 years, with ages ranging from new to 15 years.

Checks and inspections

Divers varied in the attention they give to their BCD during the pre-dive safety check. The survey distinguished between two things: a) an inspection (checking the condition of the BCD and its components); and b) a function check (testing the operation of the device).

While most divers performed a function check of their BCDs before most or every dive, fewer divers actually inspected the components looking for trouble. Divers omitting such an inspection might be more likely to experience a failure than those who perform a more careful inspection.

When it came to the specific inspections and function checks performed as part of the diver's pre-dive safety checks, the survey again saw a broad spectrum of responses. Table 2 indicates various checks and inspections that divers might perform and the percentage of divers reporting that they usually complete these items.

Deep trouble

When it came to actual problems that develop with BCDs during a dive, half the divers reported that they never had a problem. The other half reported experiencing problems, but most report that such an occurrence is rare. Table 3 (next page) lists the five most common reported problems and the percentage of divers reporting that problem.

Stuck inflator valve

A stuck inflator, experienced by 26 percent of the respondents, was the most commonly reported problem. The actual occurrence may be slightly higher, since the number included divers who reported that their BCDs are not equipped with a power inflator. The cause and results of the stuck inflator varied considerably, according to the descriptions provided by some respondents. One divemaster reported a stuck inflator at a depth of 82 ft (25 m). Fortunately he was able to disconnect the low-pressure air hose from the device at a depth of 30 ft (9 m), thus saving the day.

Another diver wrote, "I suffered a stuck inflator in shallow water — less than 16 ft (5 m) deep. I stopped

SCUBA HISTORY

INVENTION OF THE BCD

The first version of the BCD was developed by Maurice Fenzy in 1961. Early versions were inflated by mouth underwater. Later versions had their own air inflation cylinder. Since 1969 most modern BCDs have used inflation gas from one of the diver's main gas cylinders, in addition to an oral inflation tube that is used at the surface in the event the diver has no high-pressure gas left. (wikipedia.org)

TABLE 1. BCD INSPECTIONS AND FUNCTION CHECKS

Frequency of safety checks	Reported percentage of divers who INSPECT their BCD	Reported percentage of divers who FUNCTION-CHECK their BCD
Never	0	0
Rarely	6	2
Occasionally	20	6
Sometimes	6	0
Before most dives	30	14
Before every dive	38	74

TABLE 2. SPECIFIC BCD SAFETY CHECK ITEMS

BCD pre-dive safety check items	Percentage of divers who complete this check item
Auto inflator function	74
Deflator function	84
Dump valve function	72
Overpressure relief valve function	40
Oral inflator function	80
Mouthpiece security	52
Stitching condition	46
Metal/plastic fasteners condition	66
Velcro fastener condition	60
Hose/connector leaks	76
Hose/connector condition	78
Weight release function (weight integrated models)	50
Breathing air cylinder security	70

TABLE 3. FIVE MOST COMMON BCD PROBLEMS

Problem	Percentage of divers reporting the problem
Stuck inflator valve	26
Accidental operation/button confusion	20
Accidental loss of weights	17*
Leaking hoses/fittings	14
Hose/connector failure	8

*Percentage of divers with weight-integrated BCDs

my out-of-control ascent by using the emergency air dump.”

A few divers reported a stuck inflator resulted from either of the following events:

- 1) salt crystal accumulation; or
- 2) an accumulation of mud, sand or other debris on the inflator button.

Several divers reported that the inflator valve leaked slowly, requiring them to periodically vent their BCD to maintain proper buoyancy. However, a situation like this could be a particular problem for a diver who becomes distracted during the dive.

Accidental operation of the inflator

The second most common problem reported by the divers was accidental operation of the inflator, or confusion with the inflator control buttons. While it is unclear exactly what the results were in these incidents, it does suggest that at least some BCD designs suffer in the so-called “human factor department” — i.e., what some designers see as intuitive may not be as clear to the divers employing their devices. From this perspective, divers considering the purchase of a new BCD or power inflator mechanism should evaluate the design carefully.

Losing weights

Accidental loss of weights appeared to be a significant problem among divers equipped with weight-integrated BCDs. One in six of these divers reported having accidentally lost weights with these devices. As one diver

wrote, “I’ve lost weights from my integrated system three times. Now I use a weight belt rather than an integrated-weight system.”

Another diver related an incident that undoubtedly resulted in unnecessary excitement. “I was at a depth of about 90 ft (27 m) when I caught my right weight pocket on a piece of wreckage, causing it to detach. I was able to grab it and replace it, but it fell out again during the ascent. It didn’t result in a rapid ascent, as I still had my ankle weights and the left-side weights. I have since switched to using a weight harness and carry very little weight in the BCD.”

Some problems reported by the divers seem to indicate both human factors and procedural issues. One diver wrote about a situation that developed when he tried to share air with an integrated alternate air inflator. The diver confused the power inflator hose with his snorkel.

“I discovered this on a shallow-water training exercise, where I first gave my primary regulator to my buddy,” he said. “Then I put my snorkel into my mouth, thinking it was the alternate air. This can be potentially serious when deploying the integrated alternate air source. The problem is addressed by putting the alternate air source in your mouth before giving your primary second stage to your buddy. Do not repeat this mistake at depth!”

Another incident reported highlights the importance of closely checking the BCD during the pre-dive safety check. Wrote

one diver: “I had the dump-valve pull tab catch under one of the shoulder pads and continually dumped air. I was new to diving and quite overweighted. I was about to ditch my weights to stay on the surface when my buddy figured out the problem. I remove the tabs on the dump cords now.”

Maintenance matters

Divers vary considerably in the degree of periodic and preventative maintenance they give their BCDs. Ninety-six percent of divers reported rinsing their BCDs after each dive — on the day of diving or dive trip — but only 60-70 percent reported that they clean and check fittings and fasteners. The importance of a more thorough check of the devices is highlighted by other reported incidents, such as failure of stitching, fasteners and dump valves.

Many divers seemed to ignore the importance of professional maintenance when it comes to their BCDs. Roughly 30 percent of the divers reported that they never had their BCDs professionally maintained. A review of the data revealed that these divers reported a greater frequency of problems than do those who have their BCD professionally maintained yearly or per manufacturer recommendation.

Modern BCDs are generally well designed and reliable, but they certainly aren’t infallible. By redoubling efforts in the maintenance and pre-dive inspection of these devices, we can improve our chances for a dive that’s memorable for all the good things about diving. ■

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RICK LAYTON is an experienced diver and longtime DAN Member who writes regularly on the subject of dive safety. He invites DAN Members to visit www.scubaSTARnet.com to participate in future safety surveys and to report equipment, training and procedure-related diving incidents