by John Page Williams

How's the Holding?

What's the best anchor for the Bay's muddy bottom? Here's how the pros find out!

John Page Williams photos

RIGHT: **Members of the *Rachel Carson* crew, Fortress team members and journalists conducting anchor tests.**

Last summer Fortress Marine Anchors conducted a rigorous test of anchor holding power in the mud that cruising people most often encounter in the Chesapeake. They hired the University of Maryland's 81-foot Research Vessel *Rachel Carson* out of Solomons, Md., and invited a half-dozen curious boating writers, plus engineers and IT specialists from Fortress. Chuck Hawley, former vice president for product testing at West Marine and now an independent testing consultant was also along for the ride. Fortress Marketing and Sales Director Brian Sheehan, Fortress Test Engineer Chase Hallerberg, Captain Mike Hulme and First Mate Rob Nilsen went out of their way to make sure that the testing was truly impartial. They were as curious as the rest of us.

Over the course of four test days, *Rachel Carson*'s crew and a rotating group of journalists (I was there the first day and a half) worked their way through 11 anchors that Fortress had anonymously purchased for the test. Steaming out into the Patuxent River to a large shelf of muddy bottom, they set the boat on a datum (specific location) and proceeded out in an azimuth (specific direction) that varied from anchor to anchor to rule out plowing the same piece of bottom more than once. The protocol was to deploy the anchor (generally in about twenty-six feet of water), run slowly along the azimuth to a scope of 5:1 and then add 100 more feet. At that point, Hulme set the *Rachel Carson* on her Dynamic Positioning System (DPS), and Nilsen began reeling the anchor back with the winch, while the tensiometer's feed to the *Rachel Carson*'s IT system showed us a plotted curve of how well that particular anchor held over a 10-minute pull.

Early in the process, Sheehan remarked that "Any anchor can fail to set the first time on any given day." Thus he and Chase took the best five of six curves to judge each anchor's overall performance. There were still variables that we couldn't control. Foremost was the fact that

LEFT: **Ocean Marketing's Jeff Cox chats with Chuck Hawley (red hat) during testing; and inspects the chain connection on the Manson Boss anchor.**

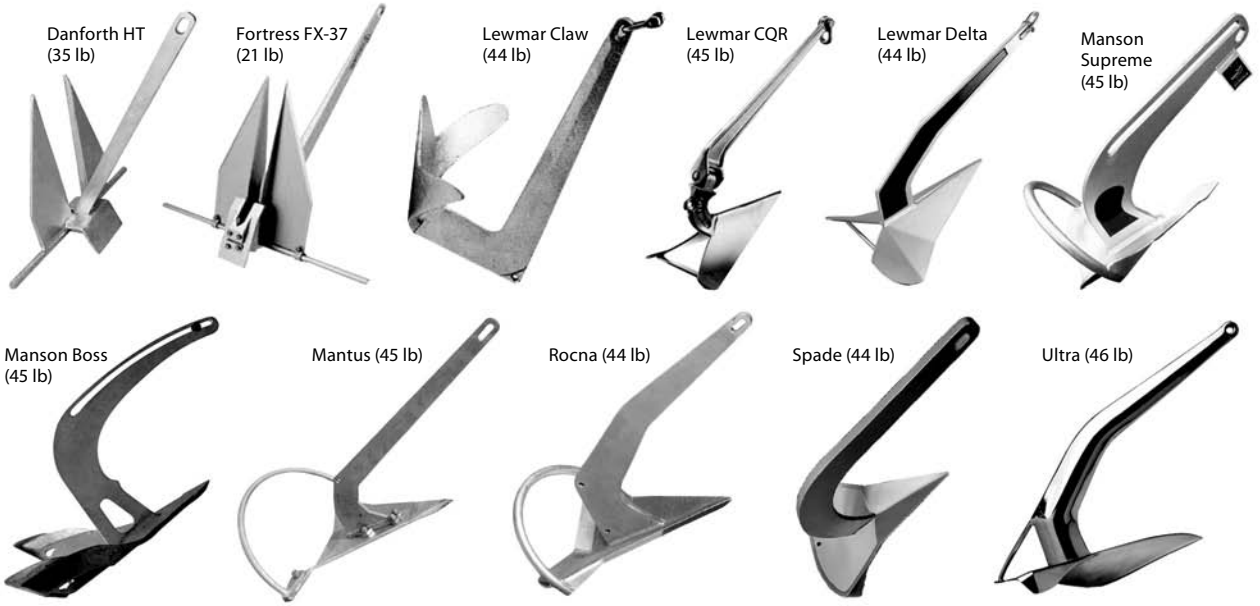
Chesapeake mud is anything but uniform—as I could see from watching the powerful Furuno FCV 585 color fishfinder display a mixture of weak and strong echoes. It was amazing to see how the bottom varied from azimuth to azimuth, working off a common datum.

Nine test anchors were plow or claw type anchors, while the Danforth and the Fortress have twin flukes pivoting on a central shaft. The elegant Ultra is stainless steel, while all the rest are various steel alloys except for the Fortress, which is made of an extruded, highly tempered alloy of aluminum and magnesium (hence its lighter weight) with sharpened fluke tips. Its blade angle is readily adjustable: 45 degrees for soft bottoms and 32 degrees for hard bottoms. We tested both configurations, so the total number of test categories came to 12. The Fortress crew had already set up a random order for the tows, making their way through the inventory of anchors on the boat's after-deck, with a videographer recording comments from Chuck Hawley after each tow. (Go to *www.fortressanchors.com* to watch all of Hawley's videos and see the graphs for each anchor.)

"Any anchor can fail to set the first time on any given day."

Was it tedious? Yes, at times, but there were both small and large incidents in virtually each tow. For example, on the first day, we watched the Manson Boss, which is a complex, welded rig with wings that appear designed to drive it into the mud and a "roll bar" to make it self-righting. It held to maximum tension of 1,450 pounds at a

Test Anchors



5:1 scope but experienced two major slips at about 7:1 before catching again.

The Fortress FX-37 set at 45 degrees drove the meter up to 2,000 pounds, at which point a passing boat's wake caused the *Rachel Carson* to lurch. The sudden change in tension blew the circuit breaker on the winch. The Fortress is designed with a precisely machined shaft that is tapered in two dimensions to bury deeply into the bottom when set at the proper angle with appropriate chain and rode. We did, however, see it fail when a short length of scrap chain became lodged between the shaft and the flukes.

The most spectacular "incident" involved an attempt on the third day to retrieve the Fortress set at 45 degrees. They ran it out to a scope of 3:1 and then winched it back to 2:1 before proceeding out to the prescribed 5:1 plus 100 feet. The final tension on this tow rose to slightly more than 2,000 pounds after 10 minutes. The problem arose when they attempted to weigh it, pulling the cable vertically from the point where it had set. The stainless cable, rated at 8,000 pounds, bent into a small arc over the deck roller, and it actually parted, leaving the Fortress and its chain deep in the mud.

In general, the plow-type anchors exhibited what Hawley referred to as "low tension consistency," with average maximum tension ranging from 350 to 680 pounds over a wide range of scope, though a number of them broke free at a scope of about 6:1 and never reset. The one exception was the Ultra, which produced an average maximum of 842 pounds. That working load is plenty for a 35- to 40-foot boat's "lunch hook" (900 to 1,200 pounds is the benchmark for a main or "working" anchor).

In Patuxent mud, the fluke-style Danforth and Fortress produced the greatest average maximum tension: 990 pounds for the Danforth HT; 995 pounds for the Fortress FX-37 set at 32 degrees; and 1,862 pounds for the Fortress set at 45 degrees.

It's worth noting that all of these anchors come from well-established manufacturers who design their hooks for a wide range of conditions worldwide. The soft mud of the Chesapeake may not show off some of them at their best. It's no surprise that many experienced cruising skippers carry two or more anchors of different designs and weights for varying bottom types and situations that can range from lunch breaks to severe storms. ⚓

Lessons Learned

So what should we take from this extensive research?

- Even with all of the engineering available in a study like this one, anchoring is still a blend of science, art and sensibility.
- "Any anchor can fail to set the first time on any given day."
- Learn all you can about the specific patch of bottom on which you plan to set an anchor. If you have a modern multifunction display, learn to read the sonar signatures of mud, sand, shell and combinations of those materials. It wouldn't be a bad idea to learn to "fly the lead pigeon," dropping a lead line with a sticky substance like tallow on the bottom to pick up a small bottom sample.
- Think about all of the constraints of your proposed anchorage, including shoreline, predicted wind and the presence of other boats.
- If you are going to depend on your anchoring systems for everything from a carefree lunch to survival in a major storm, learn all you can about anchoring. There's a lot of information out there, ranging from the Fortress website to the classic tome *Chapman Piloting: Seamanship & Boat Handling*.
- Finally, put in your time on the water; learn from both your experiences and those of your fellow skippers; and put it to work for your boat, your family and yourself.