Seamanship

BY GARY REICH

Stuck in the Mud

Fortress Tests 11 Popular Anchors and Guess Which Wins.

It's a debate that's gone on since cavemen started using rocks to anchor their rafts.

Which one works best? One rock-dweller might say, "Ugg say round rock work better," while his cavemate quips, "No, Ugg dumb; flat rock work better."

Fast-forward to the 21st century and the anchor debate still rages on, except today the question pits Danforth-types against plows, and spades against claws. And instead of Ugg and his cavemate arguing over a pile of rocks, you'll find cruisers and long-distance voyagers continuing the discussion on Internet forums and in anchorages scattered around the world. Add beer and the debate gets really heated.

In the past two decades, one modern anchor manufacturer has done more than any other in trying to put some of that debate to rest: Fortress Anchors.

The company is not only well known for its lightweight aluminum Danforth-type anchors, but also for the extensive testing it has conducted to measure and compare the performance of popular anchors. The first of those tests got under way in the sandy bottom under Biscayne Bay in Florida in February 1990, and in the soft muddy bottom of San Francisco Bay in California in April 1990.

But a lot has changed in the 24 years since those first tests. Today, thanks to the global economy, boaters can choose from a wider selection of anchors than ever, with names such as "Boss," "Supreme," "Ultra," "Rocna," "Spade," and "Mantus." Never heard of them? That's OK, I hadn't heard of many of them, either.

Unfortunately, not much data exists for this new generation of anchors, and this was the catalyst that sprang Fortress into action.

"It was this influx of these new anchors into the market that spurred us on to do a new round of testing in 2014 on Chesapeake Bay," said Brian Sheehan of Fortress Anchor. "The soft mud bottom there is especially challenging for anchors. This made the Chesapeake an obvious first choice for these tests."

Chuck Hawley, acting as an independent reviewer, deploys a Delta anchor for testing. Each anchor was deployed and tested five different times in five unique locations.

Gary Reich

The testing kicked off in Solomons, Maryland, on a typical hazy, hot, and humid August Chesapeake summer day. Besides the crew, a dozen marine journalists were on hand to witness the trials. Fortress did provide each of us with a free inflatable life vest, a nice treat, to be sure, but also great for keeping things safe.

Chuck Hawley, former vice president of product testing at West Marine also attended the event and would serve as an independent reviewer. Another of his contributions was helping to develop the testing protocol with which the anchors would be tested.

The group gathered at the University of Maryland Center for Environmental Science's dock where the research

SEE THE VIDEO.
Scan the QR code or visit www.passagemaker.com and enter the search term "anchor test."

44-LB. LEWMAR CLAW

45-LB. LEWMAR CQR

21-LB. FORTESS FX-37

35-LB. DANFORTH HT

44-LB. LEWMAR DELTA

44 LB. SPADE

The University of Maryland Center for Environmental Science's 81-foot Rachel Carson *served as the test platform during the four days of anchor testing.*

vessel *Rachel Carson*–the test platform–was docked and ready to rumble. While you might think that using the vessel's twin 1,200-hp MTU diesels for this testing, it was actually two different pieces of more delicate equipment that were crucial to the Fortress testing protocols: her precise oceanographic winch and Kongsberg cPos Dynamic Positioning System.

Hawley explained the intricate testing protocol to everyone aboard. Over four days, 11 different anchors would be tested, five separate times in five unique locations (datums). To ensure that no anchor would be dragged through the furrow created in the bottom by a previous anchor test, each one would be pulled in a different compass direction from the center of every datum. The rode for each anchor would consist of 20 feet of 3/8-inch high-test chain and a length of 5/16-inch 7x19 wire rope, which was spooled to the *Rachel Carson*'s oceanographic winch.

Once each anchor was deployed, the protocol called for enough rode to be paid out so that a 5:1 scope was achieved. Next, an additional 100 feet of rode was paid out to achieve an initial scope at the beginning of the test of around 8.3:1. With the appropriate amount of rode paid out, the *Rachel Carson*'s dynamic positioning system was engaged to keep her stationary, and the oceanographic winch set to haul back the anchor rode at a precise speed of 10 feet per minute.

That gave each hook 10 minutes to engage the bottom, at varying scopes along the way. A device called a running line tensiometer measured rode tension in pounds. The data from the tensiometer was fed to a bank of data recorders, and also displayed on a pair of flat-screen monitors, where media members could watch and note the progress and performance of each test as it happened.

Quite honestly, it took some time to figure out how the protocol worked, and what, exactly, we were seeing on the screen. To most of us, the squiggly lines on the monitors didn't mean much, but after some time had passed, we were able to at least make some educated guesses about what we were seeing. A long, straight line across the bottom probably meant that the anchor wasn't setting while a series of peaks and valleys likely meant that an anchor was setting and then letting go.

Some data could not be interpreted, like the way most every anchor produced a series of smooth peaks and valleys at the beginning of each

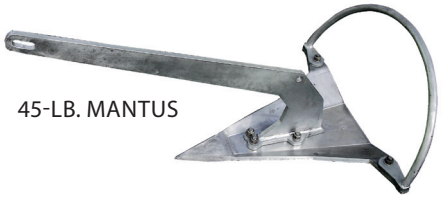
Fortress Anchors; Gary Reich

PERFORMANCE CHARTS.
Scan the QR code or visit *www.passagemaker.com* and enter the search term "anchor charts."

45-LB. MANSON BOSS

45-LB. MANSON SUPREME

45-LB. MANTUS



44-LB. ROCNA

46-LB. ULTRA

test (something we later hypothesized had to do the the dynamic positioning system, not the anchors).

After the first day of testing (19 anchor pulls on day one), many of the anchors appeared to simply not set or were performing surprisingly poorly. Even Fortress' FX-37 with its flukes set at the soft mud 45-degree position, appeared to not engage with the bottom. Some of us thought that the gentle, slow, continuous pull and overall high initial scope that the protocol called for was sometimes just not enough to orient many of the plow anchors in their ideal digging position.

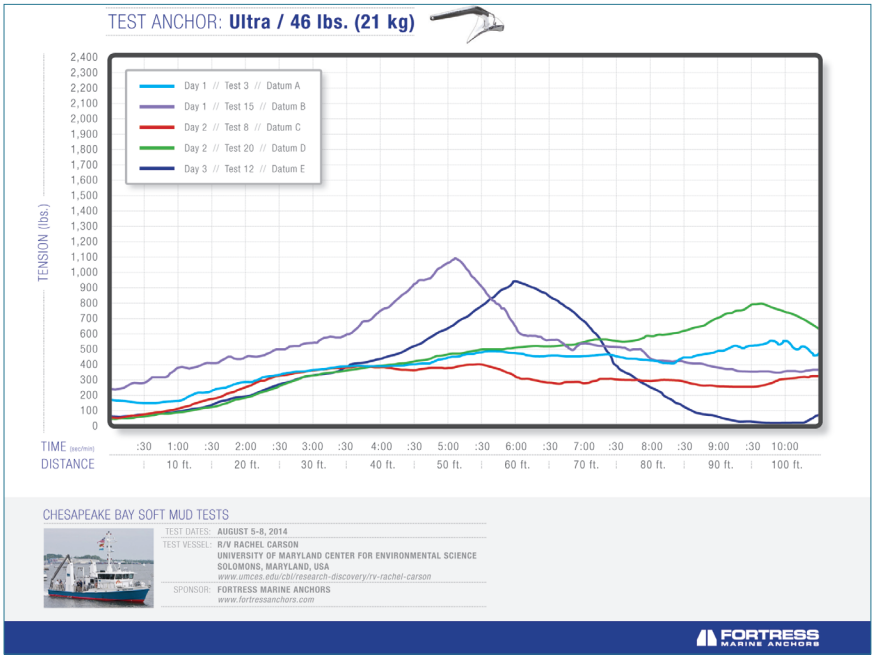
Fortress saw this limitation, and on the fourth day of testing, it pre-set each of the remaining eight anchors according to its own soft-mud anchoring recommendations. Each anchor was deployed onto the bottom per the usual protocol, but once a scope of around 2.5:1 was achieved, the anchors were winched in until not more than 15 feet of rode had been retrieved, or 300 lb. of tension was displayed.

After that, the testing continued by the original testing protocols. While some anchors did seem to perform more admirably using the pre-set method, in general, almost all of the eight anchors tested in this manner displayed similar performance to the original testing protocol.

There was enough data collected and observations made to fill a book, much less a magazine article, but in general, the Danforth and Fortress anchors ruled the four days of testing. The 35-lb. Danforth High-Tensile exerted a maximum tension of of around 1,400 lb., while Fortress' FX-37 held to nearly 2,100 lb. at the 45-dregree fluke angle (and 1,200 lb. at the 32-degree setting). One FX-37 test even saw 4,000 lb. during retrieval after a test had concluded, which caused the wire rode to break. The company even did a single test of its FX-16 model that held up to more than 4,000 lb. and took 15 minutes to break free.

Most of the spade/plow/scoop-style anchors displayed what could be classified as average performance in the five-pull testing. The most consistently above average of the group were the

Below is the combined data for all five anchor pulls using the 46-lb. Ultra anchor. The best pull achieved a tension of 1,100 lb. while the average result tended to be closer to 800 lb.



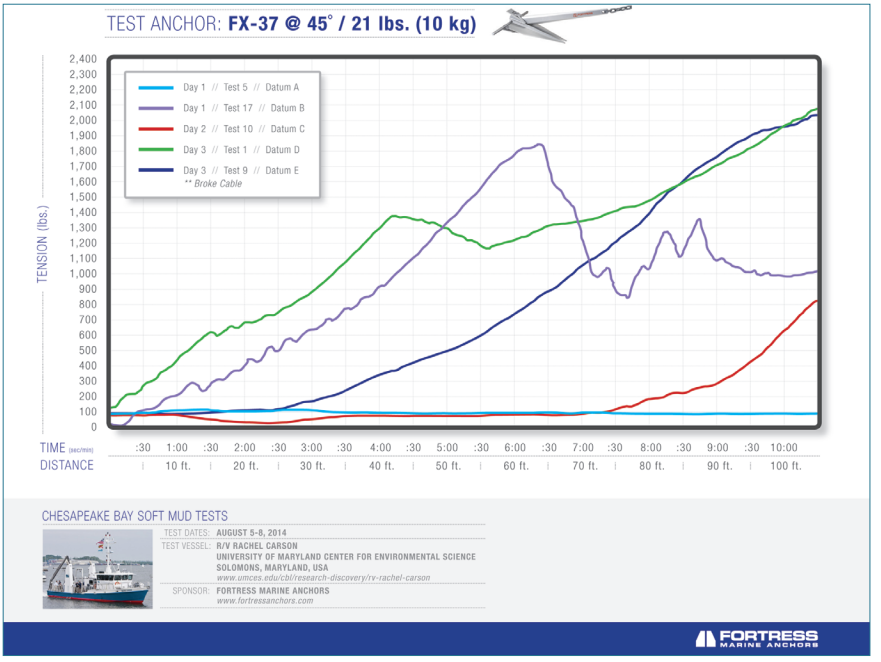
Fortress Anchors

45-lb. Mantus and 46-lb. Ultra anchors. The Mantus peaked at around 850 lb., but it was its ability to set and hold at between 300 and 700 lb. consistently in all five pulls that distinguished it. The Ultra peaked at 1,100 lb., but was also generally capable of setting and maintaining between 200 and 600 lb. of tension.

The remaining anchors–the 45-lb. Supreme, the 45-lb. Boss, and the 44-lb. Spade–performed similarly to the others in this group, although the Boss exhibited one exemplary pull at around 1,250 lb. The Claw (ex Bruce) and CQR anchors also displayed consistent holding, but generally at lower tensions between 200 and 400 lb. Those two also had their own peaks–around 800 lb.

Underperformers included the 44-lb. Delta and the 44-lb. Rocna. The Delta appeared to set consistently to around 300 lb., but often dropped off and seemed to drag, as soon as the scope shortened in three of the five tests. The Rocna also appeared to have trouble setting and, like the Delta, also appeared to drag in three of the five tests about four minutes into each test. That said, both anchors did set and hold up to about the 700-lb. mark at some point during the testing.

This may well be the biggest surprise of the day, given that both Delta and Rocna have excellent reputations among serious cruisers. Rocna disputed the results, noting that tests conducted by



As you can see, when compared to the test results on the previous page, the host anchor achieved much higher tension numbers on all five pulls. Over the full course of testing, the Fortress and Danforth-style anchors dominated the competition.

Sail, a PassageMaker sister publication, tell a different story.

"Anchor testing involves a large number of variables, which if not properly controlled can bias the outcome," says Mark Pocock of Canada Metals, the maker of Rocna anchors. "The results of these tests, sponsored by one of Rocna's competitors, are not consistent with independent tests that consistently rank Rocna as a top performer. Combined with the massive positive feedback from our worldwide customer base, including extreme high latitude sailors in the Arctic and Antarctic, we are confident that readers will appreciate Rocna's longstanding and independently documented reputation as a top choice for performance anchoring solutions."

Given soft mud, the Danforth-style anchors performed very well, while most plow, scoop or spade type anchors offered semi-consistent results between 200- and 800-lb. tensions and performance above that range for the plow/spade/scoop anchors were definitely the exception, not the rule. To give all of these results some scale, Fortress recommends an anchor capable of 900 lb. of holding power to hold a 35-foot boat with average beam

and windage in 30 knots of wind. A 40-footer needs 1,200 lb. and a 50-footer requires 1,600 lb.

While I think Fortress did an admirable job with its testing protocols, I found some limitations. The first was the slow-speed set-and-pull method with extra-long scope. Although that hypothesis seemed to vanish when Fortress tried pre-setting anchors, it still saw the same general results.

Perhaps the biggest limitation was the absence of a protocol that established any of the anchors' abilities to reset and hold when pulled from the opposite direction, much like what happens when a boat swings on a tide or wind change. Conventional wisdom about Danforth-style anchors is that they ofen have difficulty resetting when there is a 180-degree shift in the pull, as in the tide turning.

Fortress' Brian Sheehan disagrees. He points to the extreme difficulty the crew had in retrieving the Fortress and Danforth anchors after some of the higher-tension pulls, saying, "I have heard comments about these anchors breaking free during wind shifts, but after burying them in this soft mud bottom, and seeing the difficulty getting them out at a 1:1 scope, it appears impossible that they would ever break free at higher scopes, no matter what the direction of pull. Period." Without engaging in the debate, I can say that Fortress' overall testing protocols appeared to beconsistent and transparent in most every way.

So it really begs the question: Given the exemplary performance of the Fortress and Danforth hooks, and the predominance of soft mud bottoms in the world's cruising grounds, why aren't there more of these anchors on the bows of our boats? With a little encouragement from the editor who assigned me this story, I asked my fellow journalists the same question. Surprisingly, a lot of the answers came down to looks and design. "They don't fit nicely on an anchor roller with another anchor," said one colleague, while another said, "They're sort of unwieldy and awkward to handle."

And, of course, there is that reputation for for pulling out during a wind or tide change, which Fortress disputes.

In my years of cruising I've always used Bruce and CQR anchors as single-hook solutions, even in areas with large tide ranges–and they've never let me down. Maybe it's my own perceived fear of a Danforth letting go that's kept me from using one more often. Guess I'm just not sure that I want to test the theory on my own in the real world.

All in all, it's hard to argue with the data, and that data shows that among 11 different anchors in soft mud, Danforth and Fortress anchors got the highest marks.

And no, I didn't write that because Fortress gave me an inflatable life vest; those are just the facts.