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Inside Report from a PM Editor Who Competed

POPULAR MECHANICS

JULY 1963
35 CENTS

Set-and-Forget Lawn Sprinkling

What to Look for in Buying a
TWO-WAY CB RADIO

New, Way-Out
Watercraft

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JULY 1963
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INTERNATIONAL EDITIONS • SPANISH • CARIBBEAN • FRENCH • PORTUGUESE

Features of Special Interest

For the Shop Craftsman

Regular Departments

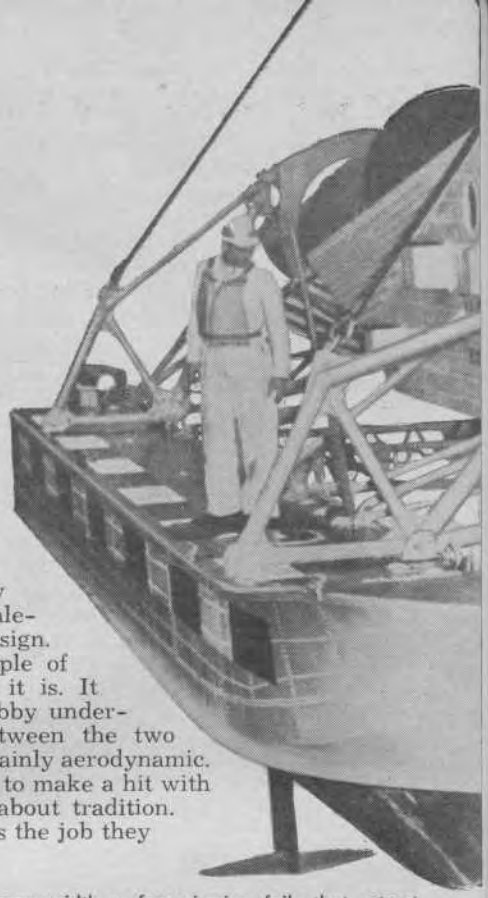
Carnival of New Way-Out Watercraft

Who says that naval architects are conservative? These wild designs hardly give a nod to tradition

SOME OF TODAY'S hottest new special-purpose boats almost defy description in ordinary boating terms, yet they look like old-fashioned whaleboats beside Boeing's new HTC experimental design.

This jet-propelled hydrofoil reminds most people of a low-flying plane, and that's just about what it is. It actually flies above the surface supported by stubby underwater wings. The fuselage/cabin suspended between the two pontoons never touches the water, so its lines are mainly aerodynamic.

A boat no longer has to look "boatlike" in order to make a hit with the public. Most new boaters couldn't care less about tradition. They're far more interested in whether a boat does the job they want it to do, regardless of radical appearance.



28-FOOT HYDRO MARINER cruiser for pleasure market has beam-width surface-piercing foils that retract hydraulically, giving boat docking draft of only 1 foot. It features car-style cockpit, picture-window cabin aft

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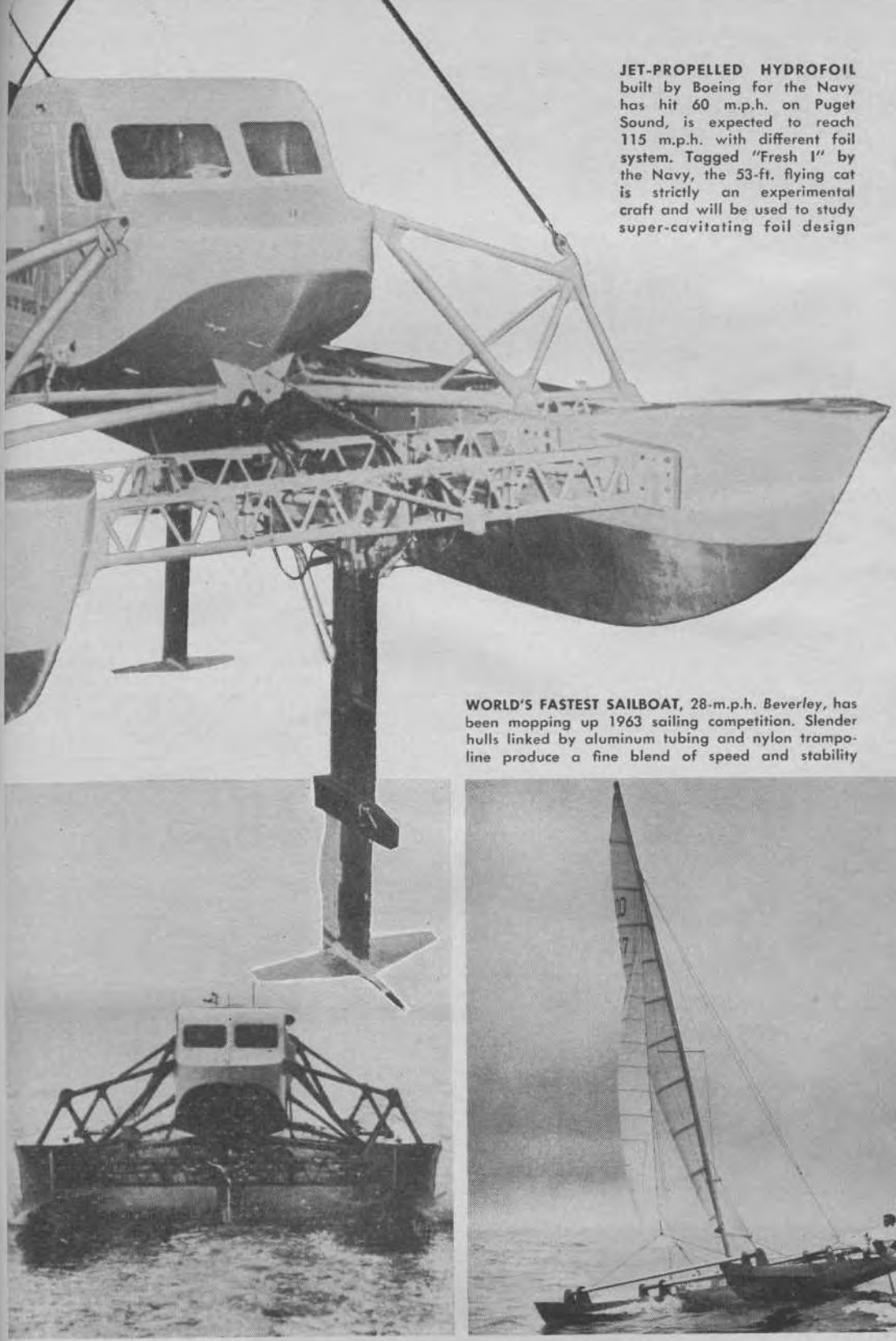

WORLD'S FASTEST SAILBOAT, 28-m.p.h. *Beverley,* has been mopping up 1963 sailing competition. Slender hulls linked by aluminum tubing and nylon trampoline produce a fine blend of speed and stability

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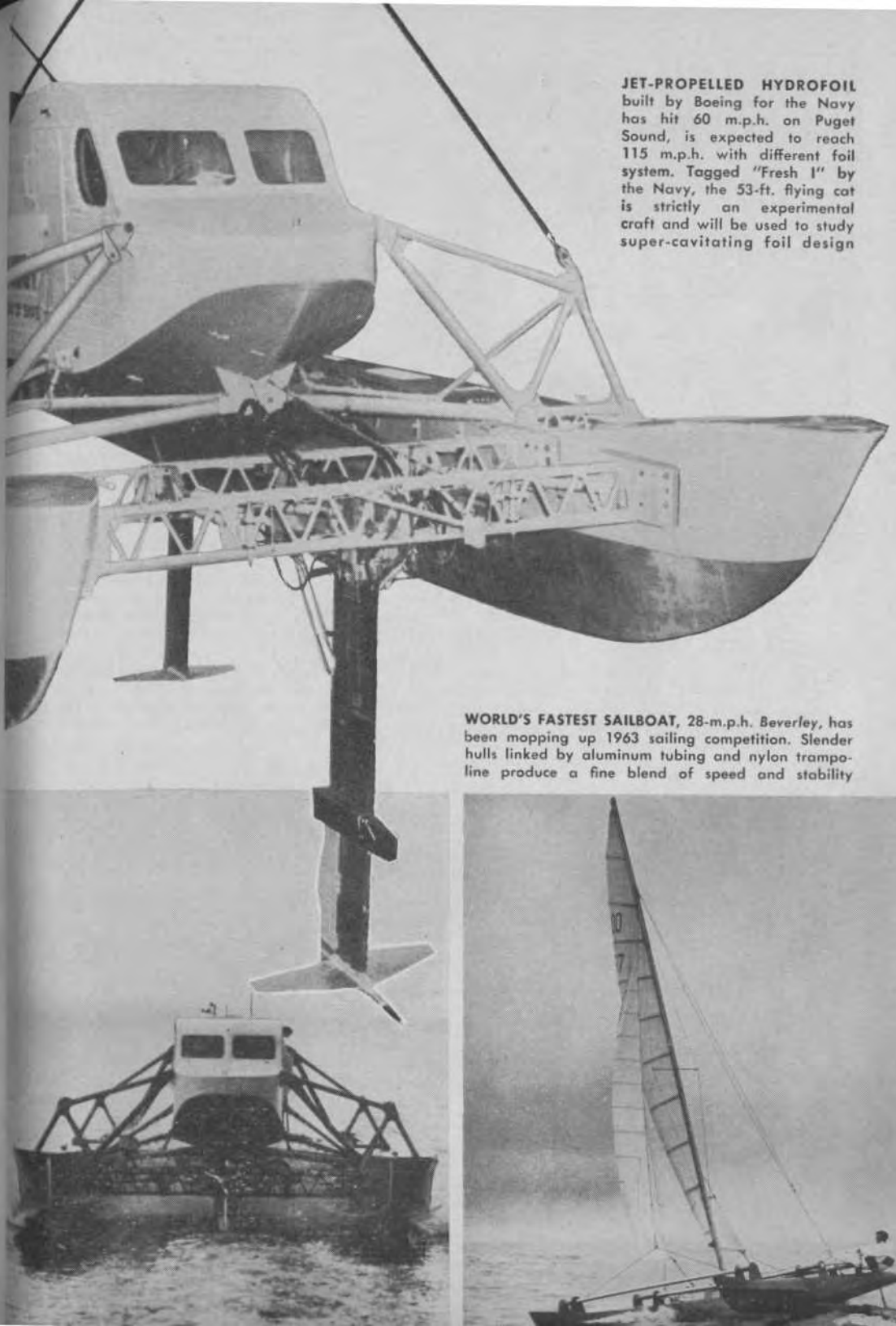

WORLD'S FASTEST SAILBOAT, 28-m.p.h. *Beverley,* has been mopping up 1963 sailing competition. Slender hulls linked by aluminum tubing and nylon trampoline produce a fine blend of speed and stability

Hydrofoil Pioneers...

HIGH SPEED CRASH OF *FRESH-1*

by William M. Ellsworth

Reprinted from the book *Twenty Foilborne Years -- The US Navy Hydrofoil* HIGH POINT *PCH-1*

Additional comments by Sumi Arima (see below)

Posted Messages about FRESH-1 *(see below)*

(Last Update 13 Jan 02)

On 18 July 1963, Acceptance Trials with *FRESH-1* in a canard foil configuration were scheduled. Supervisor of Shipbuilding (SUPSHIP-13) representative Pete Sias was aboard and occupied the co-pilot seat. Vern Salisbury, Boeing test pilot, as usual occupied the left seat at the controls. Salisbury, a Colonel in the Marine Corps Air Reserve, had been recruited from the Boeing flight line where he had been a test pilot for several years. In the rear seat, Bob Hubbard, manager of the Boeing autopilot development team, manned the instrument station. Data from the extensive instrumentation suite was recorded and also telemetered to a shore station where it was continually monitored by Boeing engineers during trials. The trial on that afternoon was ill-fated. During the high speed run, the craft completely capsized. In a taped interview of Vern Salisbury on 22 February 1984, he recalled events during the accident.

"We came down the Duamish river from the Boeing Missile Production Center into Elliott Bay and started the main engine. We proceeded hullborne to the test area where the chase boats and the Coast Guard patrol boats and helicopter had positioned themselves along the six-mile course. We traversed the measured mile off Vashon Island which the Navy accepted as valid for determining speed. Pete Sias was in the co-pilot seat which was normally occupied by a Boeing test engineer or member of the control system development group. They were usually jockeying the flaps to maintain proper foil depth. Their control input was more than I had ever recognized and consequentially I did not take into account the fact that Pete was not performing the same functions as the regular co-pilot. I had recognized all along that some adjustments were continually being made during previous R&D trials but I didn't realize they were as significant as they later turned out to be.

"As we got down to the end of the test course and were turning around to come back and complete the exercise, I noticed that we were flying a little high. Hubbard agreed that we were a bit high and I said I thought we were too high. He suggested pushing the controls over to bring her back to the right height. Neither of us recognized that by pushing the nose down we would induce a directional instability by not having 'enough feathers in our arrow' back aft. This was because the aft end was too high without enough strut in the water. So, I pushed the nose down just slightly and it seemed like it was starting to correct, but it leveled off so I pushed it down a little more. Then it took off to the right. I immediately put the wheel over to

the left-full over, thinking this would correct it. I did throttle back a little bit but I didn't want to pull the throttle completely because this was a record run and I didn't want to abort it in the middle. The craft continued to yaw and then started to roll and I pulled the throttle back further. She continued to roll and I thought she was going to catch on the port catamaran hull but it didn't. It had enough momentum to gradually roll completely over.

"When it hit, it was upside down and at a speed of about 70 knots. We had been going 80 knots down the course so I had killed off about 10 knots before we hit. The window in front of me carried away but it didn't hit me in the face; it hit Pete Sias and cut his chin pretty deeply. When I saw the glass carry away I reached back and tried to unlatch my door but turned the handle in the wrong way since we were upside down. I unlatched Pete's seat belt and tried to get him turned around. By this time the water had nearly filled the cabin and I was just about out of breath. I had grabbed a deep breath when I saw the window carry away. With Pete blocking the way to the bubble of air that remained in the cabin, I went out the window. I almost cut my hand off on the ragged edge of glass that remained. In the meantime, Bob had seen the bubble of air so he unlatched himself and got Pete turned around and got his head in the bubble. Then he managed to get his door open and both got out of the cabin. I had taken another breath at the surface and went back only to find both of them gone.

"Back on shore, Boeing had been advised of the situation by the marine telephone link and tugs and a barge crane were already underway to the scene. The chase boats picked us up out of the water and took us to the Fauntleroy ferry dock where an ambulance was waiting to take us to the hospital.

"All of the prior planning which had been done caused everything to work like clockwork. Furthermore, the instrumentation records permitted us to completely reconstruct the whole sequence of events which provided solutions to go forward with the next generation of hydrofoils. With all the procedures, controls, and safety features we had built into the program I don't think there was ever a possibility of losing someone.

"I have only one regret about the accident and that is it influenced the Navy's decision to not continue attempts to go 100 knots. I believe that in R&D you have to stay way out in advance and I don't think it was a good decision to cut off our ability to go on up in speed."

After the accident, the craft was refurbished, successfully completed all trials, and was accepted by the Navy. At this point, however, the focus of the R&D program was concentrated on the achievement of *reliable* 50-knot operations and pursuit of 100-knot hydrofoils was suspended. *FRESH-1* was then put into mothballs at Boeing and never ran again. Also, even though they were completed by Grumman and delivered to the Navy, a transit foil system [designed to provide a smooth transition from a sub-cavitating to a fully cavitating flow regime and thus permit speeds up to 100 knots] was never tested. Even though the *FRESH-1* tests were terminated, there was a positive result for the PCH. The instrumentation system from the craft was eventually installed on *HIGH POINT* and served the Navy's hydrofoil R&D program well during later trials.

Additional information provided by IHS member Sumi Arima...

[9 May 98] As for the "The Fate of *FRESH-1*", Bill Ellsworth's article is not clear as to the cause of the accident. I being Pete Sias's assistant on this project as well as the *HIGH POINT* construction project, was assigned to the accident investigation board. It was determined that the cause of the accident started from the foils ventilating to the extent that the trailing edge flaps were working in air rather than water. Previous to the accident, Bob Hubbard in the co-pilot seat would see the upward drift on height and manually increase the flap angle to regain fluid flow over the foil before full ventilation occurred. In studying the combination of traces from the telemetered data, it turned out that a combination of the rewetting of the foils at the particular moment that the helm inputs to the trailing edge rudder which was also ventilating and rewetting caused the roll over of *FRESH-1*. The board concluded that if the helm was held steady and throttles were chopped, the ship would most likely have landed on the hull without the roll over. Other safety features were recommended and incorporated, including an escape hatch and push to release door locks.

[5 Jun 00] Grumman built a transit foil for the *FRESH-1*. Dave Symington, owner of the *FRESH-1* has it stored in his son's yard. He also has the demonstration foils for the *FRESH-1*. Dave is an IHS member in Seattle WA.

[11 Jun 00] *FRESH 1* used super cavitating demonstration foils and attained speeds of 70 knots, approximately 78 mph. I left the program after the unfortunate turn over, and thus cannot attest to the exact speed reached after the restoration. It was powered by a Pratt and Whitney JTD-1 pure jet engine providing 16000 pounds of thrust. After the accident, a military version of the engine was used. which provided a little more thrust. Although another set of foils were designed for testing called the "transit foils," the Navy chose to pursue the sub-cavitating foil research rather than for higher speeds, and thus was never tested. The *FRESH 1* was subsequently surplused.

[Photos of FRESH-1 *are posted in the IHS Photo Gallery, accessible from the IHS Main Page. - Editor]*

***Posted Correspondence about* FRESH-1...**

Transition to Supercavitation

[13 Jan 02] I was reading through the story of the *FRESH 1* accident. It says that Grumman had designed a transition from subcav to supercav. Where do you think I can find that information? -- Vladimir M. Algin (v.algin@businesstalkfrance.com)

> **Response...**
>
> [13 Jan 02] I know that the foil exists at Mr. Dave Symington's yard in Silverdale, Washington, USA. Mr. Symington is the owner of the *FRESH-1*. The foil was sent to HYSTU and stored on the barge. When we were cleaning out the barge, the foil was put up for bid by the surplus people. I informed Dave (who bought the *FRESH-1* previously) that the foil was available, and thus he was able to obtain it from the Navy. I never did see any of the engineering studies for this foil. The foil was never actually tested on the *FRESH-1*, so its success has never been verified. -- Sumi Arima (arimas1@juno.com)

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Sumi Arima	mailto:arimas1@juno.com?cc=webmaster@foils.org
IHS Main Page	http://www.foils.org/index.html
the story of the FRESH 1 accident	http://www.foils.org/fresh.htm
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