

The NEWSLETTER

JULY 2019



International Hydrofoil Society

P.O. Box 1130, Severna Park, MD 21146

SPECIAL ALEXANDER G. BELL EDITION

Editors: Scott Weidle, Ray Vellinga

Contributors: Mark Bebar, Leslie Wright, Dave Acker, John Meyer, Jr., Martin Grimm, Stan Siegal

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DYNAMICS



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DISCLAIMER

IHS chooses articles and photos for potential interest to IHS members, but does not endorse products or necessarily agree with the authors' opinions or claims.

DUES ARE HISTORY

As a key part of this administration, annual dues have been eliminated. The new program is to rely on Sustaining Members and donations from any member that volunteers to make tax deductible contributions. Advertising in the Newsletter, Web Page, and Facebook will be made available for nominal contributions. Please inquire with IHSpresident2016@gmail.com to place an advertisement.

MANDLES PRIZE FOR HYDROFOIL EXCELLENCE

Mark Bebar

Once again, we thank Martinn and Connie Mandles, for sponsoring the Mandles Prize for Hydrofoil Excellence competition. The competition, is now in its 7th year. includes up to \$4,500 annually in IHS hydrofoil achievement prizes for students, with a \$2,500 First Prize and up to two \$1,000 Honorable Mention awards.

In order to open the competition to a wider spectrum of qualified entries, submissions based on work completed since 2014 will be eligible for the IHS Mandles Prize for Hydrofoil Excellence. Significant contest dates are as follows:

Competition of Application Form:
due not later than May 1, 2020

Entry (student report submission):
due not later than June 28, 2020

Awards announced: on or before
August 30, 2020

Awards presented: on or before
September 27, 2020

This is an outstanding opportunity for the next generation of hydrofoil developers to be acknowledged for their efforts to advance the state of the art in hydrofoil and hydrofoil-assisted craft engineering, design and construction. Background on the Mandles Prize and Rules for the competition can be downloaded from the IHS website (www.foils.org)

Based on the 2019 entries and award winners, we anticipate a very exciting competition and look forward to receiving many high-quality entries. Questions on the Mandles Prize can be emailed to:

Mark Bebar at:
mark.bebar@caci.com and/or
Ray Vellinga at:
IHSpresident2016@gmail.com

We will also cover some history that fueled Bell and Baldwin's interest in Hydrofoils.

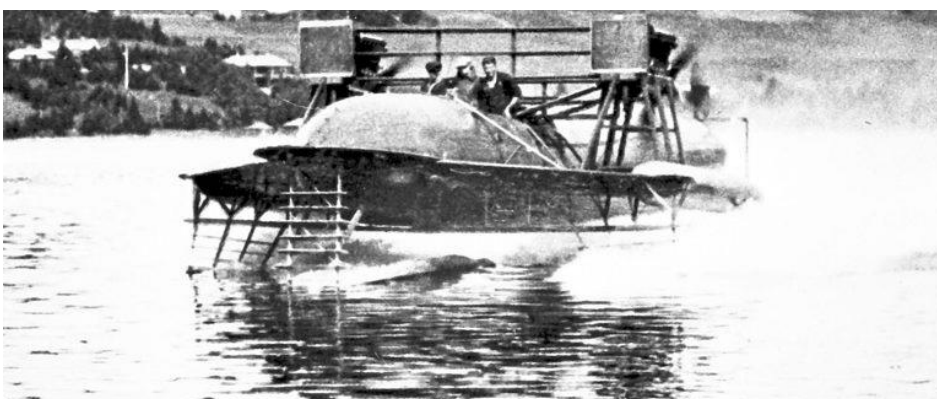
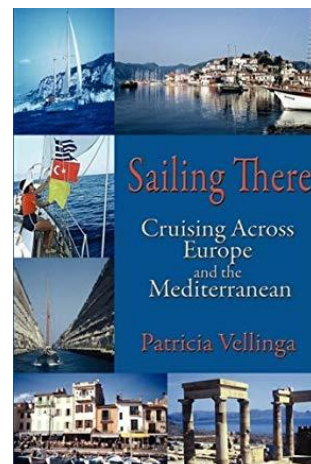


Ray Vellinga (shown with Patricia)
IHSpresident2016@gmail.com

PRESIDENT'S REPORT

Welcome to this special edition of the IHS Newsletter where we review plans to go to Beddeck, Nova Scotia for the September 9th to 11th 100 year anniversary Celebration of Alexander Graham Bell's record breaking flight of his HD-4 Hydrofoil. Working as a team, Bell and Casey Baldwin flew at over 70 miles per hour – 100 years ago! This record was set eight years prior to the end of Ford's model T production. The "T" had a top speed of 40 mph.

Read Patricia's book:



FLYING ON WATER

September 9 to 11, 2019 . Cape Breton . Nova Scotia . Canada

100 YEAR ANNIVERSARY:

A Celebration of Alexander Graham Bell's genius, innovation, Imagination & Persistence. He made boats fly.

"One of the most interesting of the strange things that have come from Dr. Graham Bell's laboratories is a weird looking glider that recently has been tearing up the peaceful Bras d'Or Lakes at the rate of 70 miles per hour." (Annual Report of the Board of Regents of The Smithsonian Institution, 1919)

On September 9 1919, Alexander Graham Bell and Casey Baldwin broke the world speed records on water – the HD-4 travelled 70.86 miles (113 km) per hour skimming across the Bras d'Or Lake – and Nova Scotia became the site of some of the most advanced technological testing and experimentation with hydrofoils in the world.

Join Alexander Graham Bell National Historic Site/Parks Canada, the Alexander Graham Bell Foundation, Alexander Graham Bell Museum Association, Theatre Baddeck, Penguin Random House, the International Hydrofoil Society, and other partners and funders. We will be celebrating the 100th anniversary of the HD-4 speed records achieved in Cape Breton and

the recreational and commercial development and use of hydrofoils over the last 100 years.

From September 9 to 11 2019 there will be community celebrations for all ages at the National Historic Site in Baddeck. Included will be the launch of a new book about Casey Baldwin, staged readings of Eric Walter's *The Hydrofoil Mystery* in the Theatre Baddeck along with presentations by the author, interactive exhibits and lectures, and a virtual reality experience of the HD4. And throughout the celebration new and unique products celebrating hydrofoils, invention, and innovation will be available at the Museum Store – on-site and online.

For Theatre Baddeck's production of The Hydrofoil Mystery

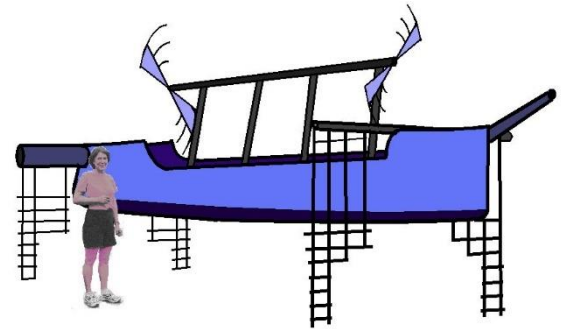
Date, time, and place:
September 9, 8:30 pm - 11:00 pm
AGB National Historic Site, 559 Chebucto Street
Baddeck, Nova Scotia B0E 1B0
Cost \$15. Phone 902-295-2069

Websites:

[Get Tickets Here](#)

[Alexander Graham Bell National Historic Site](#)

[Alexander Graham Bell Foundation Event Details](#)



Parks
Canada

Parcs
Canada



**Alexander
Graham Bell**
Museum Association

ENRICO FORLANINI

*By John Meyer, Jr.
Excerpt from Ships That Fly*

Forlanini was an Italian engineer whose interests included airships, air-craft, and helicopters. His hydrofoil developments started in 1898 with a series of model tests from which he arrived at several

simple mathematical relationships. These allowed him to proceed with designing and building a full-scale craft.

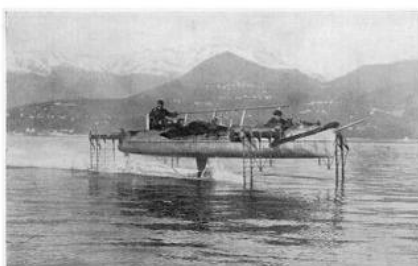
Forlanini's designs were characterized by a "ladder" foil system. You can see from a drawing of his concept and a copy of an old photograph what is meant by this apt name. Forlanini's model experiments had shown him that lift was proportional to the square of speed; therefore, less foil area was required to hold the vessel out of the water as speed increased. He obtained this decrease in foil area with the ladder scheme. Forlanini's craft weighed about 2,650 pounds and had a 60 hp engine driving contra-rotating coaxial air screws. (A submerged propeller is shown in the action photo and sketch).

Although designed to fly at a speed of 56 mph, records show that during tests on Lake Maggiore, Italy in 1906, a speed of 42.5 mph was attained.

The ladder foil system was a rather complicated structure, but the craft operated well and represented an advancement in the state of the art. Forlanini obtained a number of British and American patents on his designs, most aimed at seaplane applications.

According to Leslie Hayward, who wrote a comprehensive history of hydrofoils in a 14-part series in

Hovering Craft and Hydrofoils, the first evidence of the use of hydrofoils on a boat or ship was in a British patent of 1869 granted to Emmanuel Denis Farcot, a Parisian. There were numerous patents during the immediately ensuing years, all claiming, by a variety of means, to lift the vessel either partially or fully out of the water. Such patents were exemplified by inventors and experimenters like Horatio Phillips, G.W. Napier, Count de Lambert, and the Meacham brothers.



Idroplan being tested with submerged propeller.

BRAS d'OR

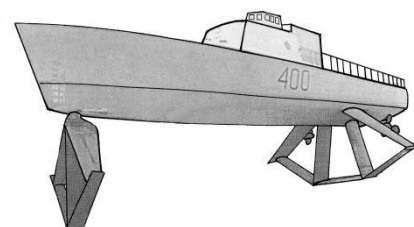
*Excerpt from of Hydrofoils;
Design, Build, Fly. Available at
Amazon.com*

The Canadian Navy... (was) committed to the motor-powered surface piercing canard idea. This gave birth to their 151-foot Bras d'Or in 1967. Weighing in at 200

tons and capable of flying at 63 knots in 4 ft seas, she is big and beautiful. Her mission was anti-submarine warfare, however in 1971 Canadian defense priorities changed. According to the International Hydrofoil Society, the importance of anti-submarine warfare was eclipsed by a need for "the protection of sovereignty and the surveillance of Canadian territory and coastlines". She retired in 1972 and today can be seen on dry land at the Musée Maritime Bernier, l'Islet-Sur-Mer, Nova Scotia 668

Enrico Forlanini's Idroplan as tested on Lake Maggiore with twin propellers. The young lady gives scale to the artist's rendition

miles west of Baddeck.



Canadian Navy's Bras d'Or.

BOOKS ON ALEXANDER GRAHAM BELL

*By Martin Grimm, IHS, Australia
and Mark Bebar, USA*

Here are some fine relevant books by local Nova Scotia authors:

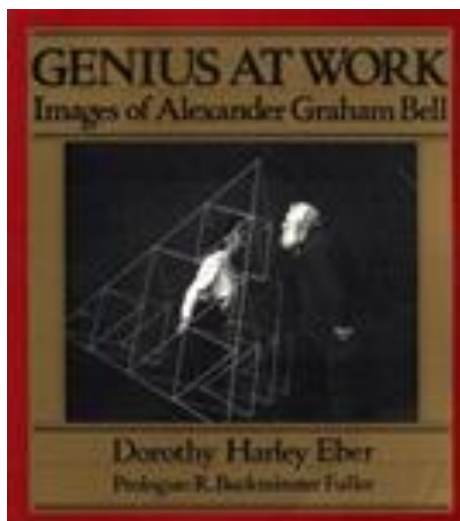
A book that you are sure to enjoy many lovely photos of Bell, Baldwin and their hydrofoil projects is *Genius at Work – Images of Alexander Graham Bell* by Dorothy Harley Eber and published by McClelland and Stewart Limited of Toronto in 1982. ISBN: 0-7710-3036-3. I hope this one may be in stock at the A.G. Bell museum too, for others to buy. I found my copy in a second hand bookshop in Canada years ago.

Genius At Work by Dorothy Harley Eber.

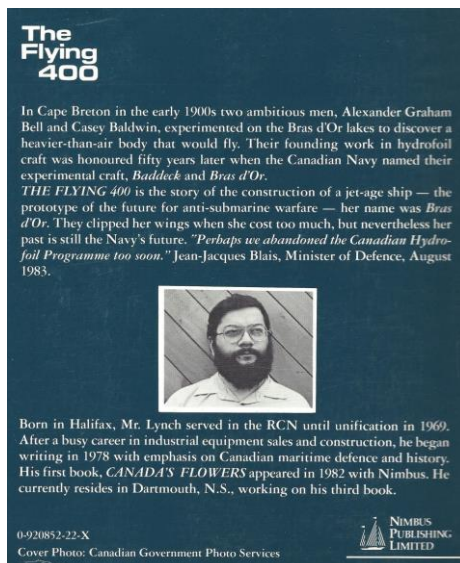


Dorothy Harley Eber is a free-lance writer with a special interest in documentary photography and oral history. She has written scripts for one film and several filmstrips dealing with Inuit life, and is the author and editor of several books about the Inuit of Cape Dorset. These include *Pitseolak, Pictures Out of My Life; People from Our Side*; and *Peter Pitseolak's Escape from Death*.

Dorothy Eber is a graduate of Trinity College, University of Toronto, and is a fellow of the Royal Geographical Society. She owns a cottage on the outskirts of Baddeck, Nova Scotia, on land once owned by Alexander Graham Bell.



The Flying 400 by Thomas G. Lynch



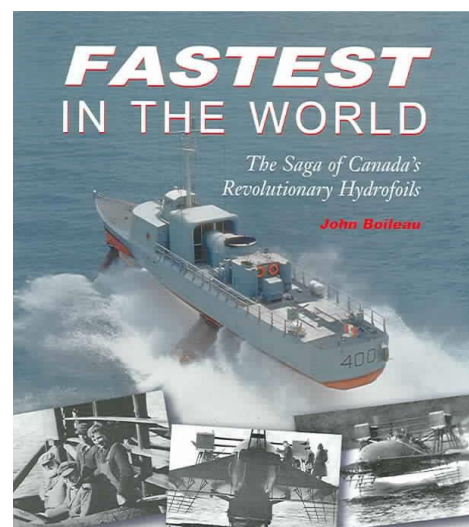
Fastest in the World: The Saga of Canada's Revolutionary Hydrofoils by John Boileau

JOHN BOILEAU retired from the Canadian Army in 1999 after a 37-year career in Canada, Germany, the United States, Cyprus and the United Kingdom.



A graduate of the University of New Brunswick and of the Royal College of Defense Studies (London), he was Chief of Staff of Land Force Atlantic Area HQ (Halifax). He was Consulting Editor for "A Century of Service: Canada's Armed Forces From the Boer War to East Timor" (2000) and is author of dozens of historical articles for several Canadian and American magazines and newspapers. He and his wife, Miriam, live on the shores of St. Margaret's Bay, Nova Scotia.

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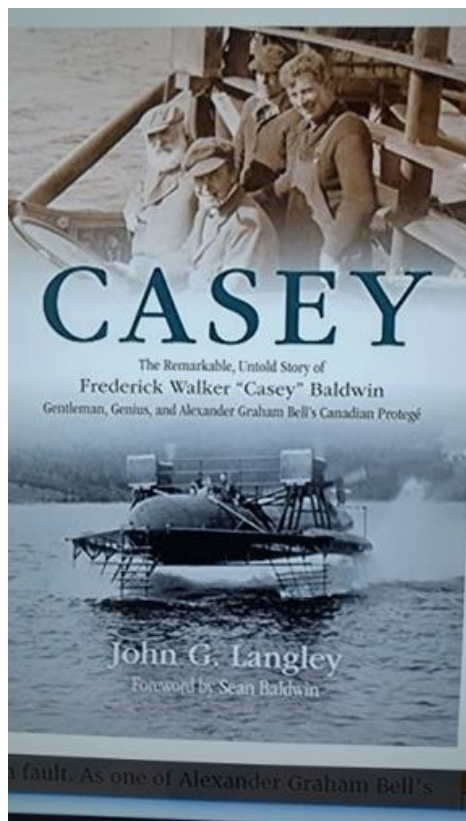


Here are two more: A new book about Casey Baldwin written by John Langley. Nimbus Publishing Limited, Halifax.

Casey: The Remarkable, Untold Story of Frederick Walker "Casey" Baldwin: Gentleman, Genius, and Alexander Graham Bell's Canadian Protege by [John G. Langley](#), foreword by [Sean Baldwin](#)

This has a chapter dedicated to "The Canadian Hydrofoil Project" with information and photos not available in other books.

need to expand on Martin's timely idea, so more details will follow. Submit any ideas to Rvell7829@gmail.com.



*Knots, Volts and Decibels –
An informal History of the
Naval Research
Establishment, 1940-1967*
By John R. Longard

*Published by Defense Research
Establishment Atlantic (DREA),
Dartmouth, 1993.*

UPCOMING YEAR 2020 CELEBRATION OF THE 50TH ANNIVERSARY OF THE INTERNATIONAL HYDROFOIL SOCIETY

By Martin Grimm.

My original idea had been that the celebration at Baddeck could simultaneously serve as an early 50th anniversary of the formation of the IHS. However, since that 50th anniversary is in 2020, it would be worthwhile for the Board to again consider whether it is feasible to arrange a separate gathering for this, as was done for the 25th anniversary (in way of a conference, complete with published proceedings). A sensible venue may be in proximity to the USS Aries museum as it would at same time give those attending the chance to visit the PHM and other hydrofoils in their collection. I am not sure I could justify two overseas trips in the space of a year. But I would still like to put this proposal back on the agenda for the Board, starting with the above subset.

Editor's note: all ~2,500 members of IHS are invited. Obviously, we



2019 BOARD MEETING TO BE HELD IN BADDECK.

By Ray Vellinga

Several IHS Board Members will be gathered at Baddeck September 9 to 11th. Sometime in that period we will be having a Board meeting and will be including all Board Members via Skype. Mark your calendars – more details to follow.

OCEANSIDE TO SAN DIEGO HYDROFOIL FERRY

By Stan Siegal

In the mid to late 1990s, I led a small group of people to market ideas within the southern California region promoting high-speed offshore ferries to provide new options for travel – without building more freeways. The principle focus for the marketing was for routes to operate between San Diego and Los Angeles with potential LA ports in Marina del Rey and Long Beach. It was clear in the marketing that for the ferry to be successful a boat speed of about 50 knots would be required to allow for reasonable trip times. Since the boats would be operating offshore in ocean waves, to satisfy the 50 knots and to provide a comfortable ride, it was apparent that only a hydrofoil boat could work.

There were many other factors in the marketing and since San Diego – LA is a huge transportation corridor, it seemed worth looking at. Additional routes were evaluated including LA to Santa Barbara, as well as San Diego to Baja Mexico with ports in Ensenada and Rosarito. These latter routes are particularly interesting since the border crossings at San Ysidro have long wait times which could make the ferry competitive. If all of these routes came to fruition, we were looking at a potential fleet of about 15 vessels each carrying 149 passengers. We could show a potential for taking about 2 million vehicles off the road with substantial benefits in emissions reduction.

This marketing effort happened to coexist with an interest by Caltrans to see if ferries could offer a new transportation mode to get cars off the freeways. The Caltrans interest ended up focusing on a project for a San Diego - Oceanside ferry intended to be a demonstration, with the idea that, if successful, it could generate interest in the form of private funding. While this was a well-intended notion, the project was started in 2001 with a \$5 million grant provided within the California state budget. There was parallel interest in the Governor's office and people thought that the \$5 million investment could lead to an operational ferry service between San Diego and Oceanside. To be successful in this corridor, the ferries would need to compete with commuting times on freeways, as well as with a coastal train service which is subsidized to encourage ridership. Clearly \$5 million was not enough of an investment to lead to a sustainable ferry system and the best to be hoped for was some level of a proof of concept. Since this thinking wasn't shared by the politicians, the demonstration quickly became an adversarial project.

The \$5 million became a grant that was provided to the Port of San Diego to administer as a project. The Port conducted a competition which we

won and actually started the ferry service in 2003. Some of the \$5 million had to be used to build docks in San Diego and Oceanside as well as to conduct environmental studies. One year of operation was planned. There was only enough money in the grant to allow us to lease a single boat which can't really showcase an operational transportation system. Shown below is the partial hydrofoil boat that was leased from Navatek in Hawaii. The picture shows the boat operating at 40 knots on sea trials in Honolulu. Navatek had a plan to add a lifting body to get the stern out of the water but our politics didn't allow enough time for that to happen. The "tail dragger" effect with this leased boat caused many issues.

Within San Diego bay we were able to operate at about 40 knots with a smooth ride and a low wake. Once we exited the bay and got out into the ocean, the waves forced us to slow down to about 25 to 30 knots and the ride quality was poor.

Initially, the State insisted that we focus the operation on commuters



with the idea that a morning trip would take Oceanside passengers to San Diego and return them in the evening. With a single boat that didn't work so well and after a few months we convinced them to let us focus on showcasing the boat to passengers. In the period from March to August in 2003 the boat carried tourist and recreational riders between Oceanside and San Diego and carried over 4,000 people. In the last month of service, the boat often left Oceanside with a full load. In general, we were able to show that passengers enjoyed the ride in the ocean. Operating in winter months would be problematic since the wave encounters would create a poor ride.

the HD-4 became fully extended on its main foils and, at about 50 mph, turned and began its clocked run on tip toe down the Bras D'Or at 70.86 miles per hour! I wish I had been there that day.

The HD-4 was an outgrowth of Alexander Graham Bell's early flight experiments with man-lifting tetrahedral kites. The kites had become large and heavy enough to require towed water launches. Hydrofoils attached to the catamaran launching hulls provided about the only real successes in this dead-end search for heavier-than-air flight. Subsequently, hydrofoil development became a separate area of inquiry, catalyzed in 1911 when Bell met Enrico Forlanini, the hydrofoil pioneer, in Italy and rode in his ladder foil boat.

the spirit of neutrality that was the official U.S. position at that time by developing a potential instrument of war. The picture changed, however, when the US entered the war in 1917, and the Allied admiralities sought proposals for submarine chasers.

Bell and Baldwin tendered two designs for hydrofoil craft stressing the high-speed potential and slight immersion which would immunize them from torpedo hazard and give the ability to operate over the top of anti-submarine nets. The capacity and lift of these boats was adequate for the carrying of torpedoes and depth charges. The first war-time proposal, the HD-4, designed by Baldwin, was pretty much what you will see in this article. The vessel was a creature of the air as much as the water.

Bell - Baldwin Hydrofoil HD-4

By Dave Acker

*Reprint from the Summer
2000 Extra edition of The IHS
Newsletter*

Cattle milled nervously in distant pastures as the two Liberty engines began blowing through twenty-four short exhaust stacks. The heart-stopping blast of noise and spray amplified as the craft moved awkwardly away from the dock, and forward speed increased so slowly as to put the issue in doubt. Finally, the vessel began its painful rise from the surface. At some distance out,

Bell and Frederick W. "Casey" Baldwin's first "Hydrodromes" (HD-1, 2, 3) were basically penguin (non-flying) biplanes whose major lift was stubby air foil wings. These proved un-rewarding because of persistent structural weaknesses, and the aircraft-oriented approach was all but terminated with the outbreak of the Great War in Europe in 1914.

Bell's laboratories and home at Beinn Breagh, near Baddeck, Nova Scotia, placed him in a delicate political situation. As an American citizen in Canada, a combatant nation, he was reluctant to violate

Vessel Description

As prelude it should be known that the hull/fuselage of the HD-4 was very lightly built... much like an old-fashioned canoe, which is to say it was made of formers or bulkheads connected by longitudinal stringers. This assembly was covered spirally with scarfed veneer stock and finally topped by a layer of ½ inch strip laid fore and aft. Embedded in the outer shell were steel wires for stiffness in the long axis, and spirally wound about the hull were eight pairs of cables for resistance in torsion. Final covering was marine glue, canvas and dark gray paint.

The hull was a 60-foot cigar-shaped cylinder with a maximum diameter of about 5.75 feet. This hull was the main structural member providing flotation at rest, crew accommodation, fuel, and proposed military load. The forward wing-like sponsons supported the power plants and their mountings and carried “Balancing Hulls” or pontoons of about 20 feet in length at their extremities.

There were four sets of multiple-blade hydrofoils. Each blade had an airfoil cross-section:

The ladder-like bow “preventer” was essentially an anti-pitch device helping in initial rising and was clear of the water when the craft was fully extended.

The main foil sets, one on each sponson, were mounted on four braced struts and were adjustable for angle of attack as well as being set at a fixed dihedral.

The stern set pivoted on a braced post. The vertical members of this set acted as rudders, supplemented by a small conventional water rudder and an air rudder fixed atop an extension of the post. Control was by a steering wheel in the cockpit via a conventional cable and drum arrangement.

Large triangular spray shields were fitted from the bow to the leading edges of the sponsons. Later, another shield encircling the bow

augmented these. These combined surfaces provided some paltry and inefficient lift, but did fulfill their function of protecting the propellers from spray.

The HD-4 was, from the outset, a test bed whose specifications changed frequently if not constantly. In fact, no two pictures seem to be the same in detail. The full-size replica at Baddeck captures its aspect on a given day and cannot show it as it was earlier or later. In fact, the drawing from which I worked did not match in every respect the replica which I viewed. This is not meant as criticism, but only as an observation of the ever-changing look of it. A few of several changes that occurred over a short time were:

- Tendered drawings and patent applications show no air rudder.
- The pontoons began as hull-shaped cylinders and were soon changed to shorter, flatter, rectangular cross sections.
- Early trials were with Renault V-12 engines of nominal 250 HP each.
- Two-blade propellers were replaced by 4-blade types.
- De-tuned Liberty V-12 engines of 350HP each replaced the Renaults.
- Motor supports were shortened.
- The airfoil “nest” above the cockpit was lowered. Spray shield

applications and conformation varied.

- A rectangular camera port was cut into the port side spray shield which may have required an additional strut on that side. The replica exhibits this asymmetry; the drawing does not.
- The hydrofoils themselves underwent constant re-design and refinement in addition to adjustments of the angle of attack (the angle between the mean chord line of the foil set and the flow).
- Chronic underestimation of the needed material strength for struts and foils resulted in a harried search for ways to avoid the plague of parts failures in these components. Finally, the smallest foils — those at the very bottom of the sets — were fabricated of saw blade steel and took nearly the full five tons of the craft’s weight on their 6.37 square feet spared only the 500 or so pounds carried by the “dirty” lift of the spray shields and sponsons.
- A large foil spanning the two main foil sets was swept away by misadventure on the day of the performance trial and was not replaced at the time or thereafter.

Editor’s Addition, Three Modifications of the HD:



POTENTIAL NEW BOARD MEMBERS

Stan Siegal



Stan Siegal has provided senior consulting and technical advisory

services in National Security based on career paths in the Government and in private industry.

With an education in Marine Engineering and Nuclear Engineering, Stan has worked for the U.S. Navy, the Defense Advanced Research Projects Agency (DARPA), Aeronautical Research Associates of Princeton, & for the McDonnell Douglas Corporation.

Stan's work is based on over 50 years' experience in high technology, with an emphasis in aerospace engineering, ship design and systems operation. As part of this work, in the 1970's Stan was working for the U.S. Navy and managing a project that used hydrofoil technology to design and build an operational ship – the PHM. Working with the Boeing Corporation, the PHM program showed that we could successfully operate in high sea states at speeds of 40+ knots and provide a comfortable ride. Boeing used this technology to design and build passenger ferries – Jetfoils which were put in service in the Caribbean and the Far East.

In the 1990's Stan used the insights gained from the PHM and Jetfoil experience to develop concepts for high speed ferries for Southern California. A range of routes and designs were considered. In 2001, Stan formed SCX, Inc. to provide

high-speed ferry service throughout Southern California. As CEO, Stan continues that work today.

Stan is a member of the Society of Naval Architects & Marine Engineers, the International Hydrofoil Society serving as a Board member as well as a judge to score papers submitted for the Mandles Prize, and is a past member of the Passenger Vessel Association and the Oceanside Chamber of Commerce.

Dwight Filley
By Ray Vellinga



It is 1998 and we are floating down the Colorado River through the Grand Canyon on a huge inflatable outboard powered raft with beer, lobsters, and hamburgers stowed for 30 passengers. There is plenty of time to chat so Dwight Filley and I start a 7-day conversation. During those talks we find much in common like military flying experience, being Commissioned Officers in the Marines/Navy, living in La Jolla, etc. Then on the third day one of us mentions hydrofoils and that was the

beginning of 21 years of designing, building, and flying hydrofoils together. It was an odd coincidence that before we met, we were both working to develop marketable recreational hydrofoils.

Following our return to California we put together an association of six hydrofoil enthusiasts. Ray Johnson is a retired aerospace engineer. Terry Hendricks was a retired PhD then developing boogie boards hydrofoils. Bob Martin and Holland Smith loved testing hydrofoils and owned a commercial foiler. Dwight Filley and Steve Ball both specialized in creating lightweight human-powered hydrofoils that sometimes were fitted with gas or electric motors.

Incidentally, during testing Steve Ball set a local record by flying 45 minutes under his own power. This begs the question if a more highly trained athlete could fly indefinitely on one of their sophisticated and efficient hydrofoil prototypes.

Up to this time, Dwight has built perhaps 8 prototype hulls and tested as many as 150 wing and system variations. This is an incredible progression from his original goal to make a row boat where the rider faces in the direction of travel. It eventually occurred to Dwight that the answer might be in adding foot pedals enabling the rider to turn around. Hydrofoils naturally would make it all more efficient.

I am part of the original group and have built and tested one or two-person outboard motor-powered hydrofoils. The team is still pretty much together with the addition of Bix Bixby an MIT educated Electrical Engineer experienced in Nuclear Test Measuring Equipment and Oxygen Enriched Breathing Assist Devices. Bix is in charge of electronic measuring of test results as well as technical videoing of test flights. Terry Hendricks was lost due to injuries suffered while performing secret night tests of his prototype hydrofoil boogie board off Swamis in Encinitas, California. Visit Swamis and you will see a plaque commemorating him and his dedication to the sport.

Dwight's technical capabilities were formed around a Bachelor of Arts degree in Sociology from the University of Colorado. After graduating, he entered the US Marine Corps Reserves. He was commissioned and reached the rank of Captain. Dwight is a Naval aviator who flew 400 missions in Vietnam and logged 1,400 hours of military flight, most of which were in combat. During one difficult mission he earned the Purple Heart due to shrapnel injuries. He considers himself lucky compared to 2 crew members were wounded when the armor piercing round, after passing through the cockpit, destroyed the IFF (Identification, friend or foe) behind him sending the shards into the cockpit and crew

area. After Vietnam Dwight served as a pilot instructor. Almost all his flight time is in the CH-46 Sea King (Phrog) twin rotor helicopter. These large helicopters are capable of carrying 25 fully equipped troops. As in all professional aviation, thorough knowledge of avionic principles is required. Of course, these same principles apply to hydrofoil flight.

Read Stan's article in this issue, pages 6-8.

[Exciting video of the Phrog:](https://www.youtube.com/watch?v=Jbc6agFEFbA)

<https://www.youtube.com/watch?v=Jbc6agFEFbA>



BI-ANNUAL FEATURED YOUTUBE VIDEOS:

[Best Electric Hydrofoils 2019 - Top 10 eFoils](https://www.youtube.com/watch?v=XAMaQ09Skb0)

<https://www.youtube.com/watch?v=XAMaQ09Skb0>

[How has 'foiling' made boats much faster? \(America's Cup\)](https://www.youtube.com/watch?v=BVuWXApdfdE&t=352s)

<https://www.youtube.com/watch?v=BVuWXApdfdE&t=352s>

HYDROFOIL IN STORMY
WEATHER:

<https://www.youtube.com/watch?v=ogwkJIY894s>

SeaBubbles testing the Fly By
Wire control system

<https://www.youtube.com/watch?v=HeAmbKeHuiE>
