CAN WE WIN THE BATTLE FOR OUTER SPACE? see page 17

ARGOSY

THE LARGEST SELLING FICTION-FACT MAGAZINE FOR MEN

Walter Reuther:

LABOR'S MAN ON THE SPOT

Feb., 35c

SMALL-BOAT

FEBRUARY, 1958 HENRY STEEGER, *Editor*

ARGOSY

THE LARGEST SELLING FICTION-FACT MAGAZINE FOR MEN

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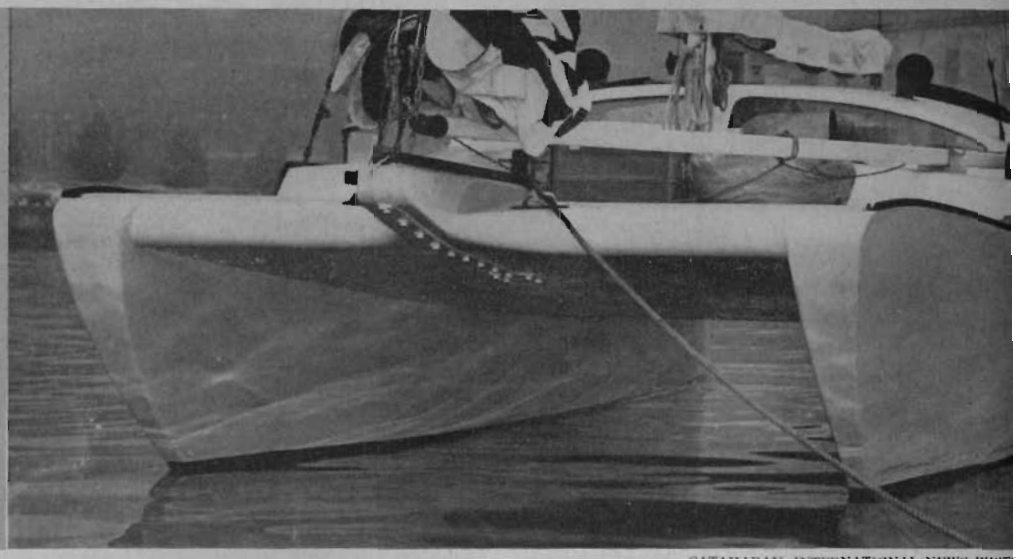
The catamaran—sailing version shown here—is fast and stable, but little has been done with motorized models.



CATAMARAN—INTERNATIONAL NEWS PHOTO

The hydrofoil, though one of the fastest hulls known, still has some serious disadvantages that must be ironed out.

HYDROFOIL—"PICS", CHICAGO

The sea sled combines many of the elements of the two hulls above but tends to slip sideways in a beam wind.

SEA SLED—DYNAMIC DEVELOPMENTS, INC.

In conjunction with the famous yachtsman, Fred Schultz, Argosy has asked John Kingdon, one of the country's ablest naval architects, to design and build a Cat, a Hydrofoil, and a Sea Sled; the fastest boats known. Here is his story of what will be done to determine which is

THE WORLD'S FASTEST HULL

Fred Schultz is the kind of client every naval architect dreams about. I recently designed for him a luxurious fifty-foot, high-speed motor cruiser. While she was a-building, Fred and I became quite friendly. He has a keen and inquisitive mind and was interested in every detail of the boat's design, construction and equipment. By the time she was nearly finished, he had become an expert on power boats.

It was, therefore, with a feeling of regret that, with launching day fast approaching, I forced myself to begin thinking of what was to come next on my drawing board. But Fred had a surprise for me.

One day when we were driving home from the boatyard, he turned and asked, "Which is the best all-around boat—a power catamaran, a hydrofoil or a sea sled?"

"I don't know," I told him. "I've flown a hydrofoil, I've driven a sea sled, and I've fussed around with a sailing catamaran. But I haven't had enough experience with any to judge their relative merits."

"Is there anyone who *has* had enough experience to know the answer?"

"I doubt it. Men like Gar Wood have done a lot of experimenting with catamarans. Hydrofoil research is going on constantly in both Europe and the United States. Albert Hickman, the father of the sea sled, has devoted a lifetime to it. But I know of no one who has gone deeply enough into all three to know all the answers."

"That's just what I was hoping you'd say. I think it would be a lot of fun for us to try to come up with the answers. Are you game?"

"Sure. But how do we go about it?"

"I've been giving this a lot of thought. First, I want you to do some research on the three types—just a surface job to find out what has been done in the small-boat field and if further experimentation, privately financed, is warranted. I'm thinking now specifically of outboard-powered boats, because they're the most popular and the least expensive to mess with.

"When you've finished this, send me a non-technical memorandum covering your findings. Then I'll get in touch with you and we'll decide where to go from there."

The next morning, I set to work—and by evening I had mailed the following:

Memorandum from: JOHN KINGDON *To:* FRED SCHULTZ

Subject: CATS, SLEDS and FOILS

In response to your verbal request of yesterday, here is a brief description of each of the three subject boats:

1. *Catamarans:* The word catamaran comes from two words (*Continued on page* 56)

by JOHN KINGDON

over as the personal domain of the Hiltons' large black Labrador retriever.

And that wasn't the only concession to the canine member of the family. Almost simultaneously with the splash of the anchor as we moored off the island, came a second splash as the dog dove over the side. As I watched, he paddled happily around the corner of the stern and out of sight, only to appear seconds later at my side. Curious to see just how he had climbed up the three-foot sides to the deck, I crossed over to starboard and discovered that he had his own gangway, a cleated plank sloping from the deck down into the water.

Lunch time was fast approaching, and equipped with snorkels and face masks, we started diving for the main course. Lying on the bay bottom was a bed of scallops looking like dirty flat stones with incandescent blue spots on their edges, and nearby were the sandy mounds covering the big quahog chowder clams. Off in the gloom a school of porgies darted away, their silvery sides flashing in the sunlight that filtered down through the pale water.

By the time we were dried off and dressed, a large pot of chowder was bubbling away on the stove, all the ingredients not more than a half-hour out of the water. The oven of the standard home gas range was lighted, and with the door open the heat soon took the chill out of the cabin. Flanking the range were a large sink and an eight-cubic-foot Servel refrigerator, a marked contrast to the musky damp hole that serves as an icebox on most boats.

Stuffed with food, we hoisted the anchor and headed back toward home. Over the stern hung a miniature rainbow etched against the sparkling white cascade thrown up by the churning paddles, and up on the roof of the pilot house stood the great gilt eagle poised to spring skyward. And yet there was a feeling of sadness in the air, mingled with the chill finality of fall, and a certain nostalgia for an era now dead. •

The World's Fastest Hull

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in the Tamil language: *kattu* (tie) and *maram* (tree). The first catamaran was a raft consisting of two or more logs lashed together, and was driven by paddles or sails.

This primitive float eventually evolved to the point where two bunches of logs were set a little apart and bound to cross logs, decked over with slats and reeds. Early in the 18th century, Polynesian Islanders replaced each bunch of logs with a light, hollowed-out log. This is the South Sea catamaran we know today. It remains steadily popular because whole families can be transported safely and quickly on its broad deck from one island to another.

Americans who have experimented with cats have modernized them by applying western design knowledge and by using plywood and other comparatively new construction materials. The typical modern catamaran hull is designed by taking a conventional hull, splitting it down the middle and using the port half for the starboard pontoon and vice versa—not forgetting, of course, to plank up the open wounds before launching. The outer sides of the two hulls are thus flat and straight and the bow waves are thrown into the tunnel between them.

Cat enthusiasts claim that this type combines shoal-water and sea-going propensities as no conventional hull ever could. And, as is obvious, the cat's inherent stability and tremendous deck space make the roomiest of any of the conventional outboard runabouts seem narrow, cramped and tippy.

Performance is good, too. Take, for instance, the twenty-one-foot outboard runabout that was developed by Kattu Project, Incorporated, of DeLand, Florida. John P. Guiler, president of Kattu Project, told me recently that she is stable, not only sideways, like all catamarans, but fore and aft as well.

This fore-and-aft stability is due to the airfoil-shaped bridge structure between her dual hulls. Air rushing in at the bow is compressed between the airfoil and the water. When the nose of the boat tries to go down, the center of air compression moves toward the bow and cushions the movement "like the cylinder of a door stop."

Besides steadying the boat, the airfoil provides lift and the faster the catamaran goes, the higher she climbs out of the water. Driven by a twenty-five-hp motor, the Kattu carries *eight* adults twenty to twenty-two mph. And because of the airfoil section, she is able to go appreciably faster into the wind than down wind!

2. *Sea Sleds:* These boats are similar to catamarans, the only basic difference being that the two halves of the sea sled are directly joined together instead of being spaced somewhat apart like those of a catamaran.

The sea sled was invented by a New England Naval architect named Albert Hickman. Just after the turn of the century, when Hickman was still a young

man, he was caught out in bad weather in a small, fast, power boat. Annoyed by the "distressful eccentricities" the boat displayed, he swore that he would develop a hull form that would be comfortable at speed in rough water. After fifteen years of experimentation, he became convinced that the chief fault of the conventional boat was its bow, which, he decided, was so narrow and had so little buoyancy that it could easily be buffeted about by the waves.

What he did then is best described in his own words:

"As those bow curves were making the trouble, I simply cut the model in halves lengthwise, and put her together the other way 'round, thus equalling wave action for both sides of the bow. This raises the keel to the point of shallowest draft, distributes the displacement fore and aft, puts the greatest buoyancy immediately under the sides of the boat, and sends the whole bow wave under the bottom."

This first sea sled had most of the characteristics of present-day sleds. It had a deck outline that was practically a rectangle. Its inverted V bottom was quite pronounced at the bow, gradually becoming less as one moved aft, and dying away at the transom, which had a perfectly flat bottom edge. Calling it the safest, dryest, fastest small craft in the world, Hickman applied for patents and started at once to promote it.

What makes the sea sled unique? For one thing, it is both dryer and more comfortable than the conventional V-bottom boat. The V-bottom hull throws its bow wave outward in the form of a spray that all too often is blown back aboard to drench the passengers. The sea sled, on the other hand, traps the white water in her inverted V, sending it under her bottom, where it forms a semi-pneumatic cushion that acts like the shock absorbers on a car, making her come-down in a seaway soft, thus improving the comfort of her passengers.

Surprisingly, the dryness and comfort don't decrease as the seas build up. I once drove a sea sled hard offshore in four-foot seas and a winter breeze. Under these conditions, the average boat is at its worst. But the sled was as soft and as dry as a lazy old excursion boat on a quiet lazy summer day.

The higher the sea, the more evident is the difference in performance between the conventional V-bottom boat and the sea sled.

As the seas rise, the sled comes down more and more softly, while the V-bottom boat pounds more and more until the speed must be cut because of the danger of pounding out the bottom of the boat or of tripping or capsizing in a quartering or following sea.

The best illustration of this was given during a now historic ocean-going race. The racing sea sled, *Orlo III,* won easily and all alone by running with almost complete absence of pounding at between sixty and seventy mph in a choppy sea that forced her competitors to slow to a crawl in order to keep running at all.

The sea sled, unlike the conventional hull, will neither nose-dive nor yaw. This is because her greatest beam—and therefore her greatest buoyancy—is located at the bow. The engineering principle behind this is quickly demonstrated. Visualize an isosceles triangle being towed by its apex. It will tend to duck under and to move from side to side. Now picture the same triangle being towed by the center of its base. It will ride straight over the ripples, high and dry.

Why has the type never been extremely popular in the pleasure-boat field? Opinions vary. Some say that Hickman's airtight patents restrained other designers from working on and improving the breed, thereby needlessly slowing down its development. Others say that the rather ungainly, boxy appearance of the boats prevented public acceptance.

But all this may soon be changed. Hickman's patents have expired, allowing others to step into the field. One firm quick to take advantage of this is Sea Sled Industries, Incorporated, Skokie, Illinois. This outfit is currently producing three fiberglas sea sleds—a sixteen-foot runabout, a sixteen-foot utility boat and a fourteen-foot utility boat.

Under ideal conditions, the sixteen-foot hull can do up to thirty-two mph with a thirty-five-hp motor.

3. *Hydrofoils:* The hydrofoil is a flying boat. At low speed, it maneuvers like a conventional boat; at half speed, it starts to rise out of the water; and at top speed, it actually flies over the surface with all of its weight supported by small submerged foils on the ends of stilts. These foils are shaped on the same principle of the wing of an airplane.

In theory, the hydrofoil is faster than the conventional hull because wetted surface, with its attendant friction, is reduced. And, also in theory, the hydrofoil rides much smoother than the conventional boat because the hull is raised above the water so there can be neither bumps nor spray. In practice, these theories hold true as long as there are ideal conditions.

But all hydrofoils have one serious fault. Since the supporting surfaces are below the water, the type has no inherent stability when proceeding at top speed. Instead, it depends on the speed for its stability. This requires a continual positive angle of attack on the part of the foils and an absolutely unimpeded flow of water past the foils and their supporting stilts.

As an example of what can happen if the delicate balance of a hydrofoil at speed is altered, let me cite my own brief experience in flying a foil. This particular hydrofoil was one of the three or four outboard-powered craft that are commercially available in this country. I flew it on a rather sizeable lake in Wisconsin. It was controlled by airplane-like foot pedals and a joystick.

I took off without too much trouble and put the boat through a series of gradual banks.

Then, just as I was gaining confidence, the boat suddenly tipped to starboard and dove down to the surface of the water, landing with a loud thump.

Badly shaken, I turned to the instructor in the after-cockpit. He grinned reassuringly, and said, (*Continued on page* 60)

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"That's something we haven't been able to lick yet. It's nothing to worry about. We simply picked up some weeds on one of the foils, spoiling its angle of attack."

We pulled the weeds off the foil and went on with my lesson. But I assure you that I wasn't completely comfortable for the remainder of the time we were out. And my fears were justified—we dove down off the plane several times more before we decided to call it a day.

My friend Hank Weiand Bowman experienced the same sensation recently when flying one of the other makes of outboard hydrofoils. This time it was due to the roughness of the day rather than the presence of weeds. He writes:

"Periodically one of the hydrofoils would cut through a wave and lose its lift. The hull then drops to that side, and the abrupt shift in balance spills the lift of the other foil. The hull naturally slams back onto the surface of the water, though it immediately takes off again and becomes airborne. Though there is no danger of capsizing, this somewhat erratic elevator-skimming above the water's surface, suddenly splashing down, and again lifting, is a sensation one would have to learn to enjoy."

This lack of stability, this tendency to dive, is so serious a problem that I am inclined to feel that the hydrofoil, at its present stage of development, is not the answer for fast, safe, comfortable family boating.

On the basis of the foregoing, my guess is that the sea sled is the best all-around boat of the three, with the catamaran in second place and the hydrofoil bringing up the rear. But I wouldn't like to be quoted on this without going into the matter further.

I'll be very much interested in your reactions.

(Signed) JOHN KINGDON

A couple of days later, Fred phoned me: "I've studied your memo," he said, "and I can see where we can have ourselves a real good time this coming spring and summer. Here's what I want you to do: Sit down and design three fourteen-foot outboard hulls—a catamaran, a sea sled and a hydrofoil. Plan on using a forty-hp motor on all three. When the designs are completed, we'll have 'em built and then we'll put them through their paces. We'll test them with varying loads, under various weather conditions and in all types of waves. By the time next fall rolls around, we should have a pretty good idea which one has the best potentialities."

"I'm all for it," I replied. "Just one thing, though. How am I going to support my office while all this is going on?"

"Don't think a thing about it. I'll send you a check in the mail tonight. As of now, you're on a monthly retainer."

Is it any wonder that I say, as I did at the beginning of this interim report, that Fred Schultz is the kind of client every naval architect dreams about?

I'll keep careful notes concerning all we discover. And, if all goes well, I'll be back next winter with further intelligence on cats, sleds and foils. • • •

The '58 Outboard

Continued from page 52

flicking a lever, which is on the dashboard.

All of the Scotts retain the Bail-A-Matic equipment which will bail out a boat at a speed of up to 300 gallons per hour, and feature an underwater exhaust, special spring mounts, air intake silencer, and built-in remote-control connections.

The new 22-hp *Sports Scott* has a type of rubber mounting that offsets the lower unit to compensate for torque, and gets a faster pickup from the double V intake valves. There is a silencer on the carburetor and, as with the rest of the line, hoods are available in six different colors.

One of the most popular-size outboards, the *Fishing Scott*, will be available again this year. The sixty-pound motor develops 7.5 hp at 4,200 rpm, and has all the improvements listed for the complete line.

Johnson will also market a V-4 engine this year. Similar to the Evinrude V-4, the motor has a 70.7-cubic-inch piston displacement and develops 50 hp. Gasoline is fed to the cylinders by twin-barrel, down-draft carburetors, and water temperature is controlled by a thermostat. Other features include a slip clutch in place of shear pins, a three-position ignition switch, and a tilt lock to hold the motor in position out of the water.

Johnson has also announced the new *Super Sea Horse 35*. This version of the popular *Sea Horse 35* has most of the improvements featured in the V-4, except that it is a two-cylinder, in-line engine.

Included in the Johnson line is a 10-hp model with a redesigned lower unit weighing seven pounds less than last year's model. The 7.5-, 5.5- and 3-hp engines remain the same, with the exception of outward styling.

One of the most popular of the lighter horsepower motors, the Wizard, will be on the market next season with a new 5.5-hp model and also a new 35-hp engine. Manufactured by Western Auto and available at their stores, the Wizard line is comprised of these two motors plus a third 15-hp model.

The 5.5 develops full power at 4,200 rpm and weighs fifty-five pounds, making it an ideal motor for the fisherman or hunter who has to carry his motor with him. There is a remote three-and-a-half-gallon fuel tank, and all controls—choke, carburetor and starter—are located on the front panel of the outboard.

Largest of the Wizards is the 35. Developing full power at 4,500 rpm, it is available with either manual or electric starting. Quiet has been achieved by the use of rubber suspension, intake silencers, a rubber-mounted fiberglas hood and an underwater exhaust. All underwater hardware is of stainless steel, and the engine castings go through a special Alodine treatment to prevent corrosion.

The above listing is necessarily short. However, if you wish further information on any specific product or boating problem, write to: The Outdoor Editor, ARGOSY, 205 East 42nd St., New York 17, N.Y. • • •