Two words come to mind when discussing iceboating — dedication and excitement. E Skeeter champ Bill Mattison details the most sophisticated of iceboat designs.

FROM THE EXPERTS

E Skeeter

Though the Skeeter is an open developmental class, after 40 years of experimentation and testing, the boats have come to appear almost one-design, or at least geographically one-design. The East Coast and Midwest are the two centers of Skeeter activity and because of the differing wind and ice conditions, the boats in these two areas of the country differ somewhat in construction and setup. Bill Mattison photo

Madison, Wisc., is a beautiful city, situated on an isthmus between Lakes Monona and Mendota. These lakes have been my second home, and since the water is "hard" approximately four months of the year, iceboating has been a natural.

The word "iceboater" should be listed as a synonym for "dedication." We work for months, some for years, to build our boats, wait for the first ice, only to have it covered by a foot of snow before we can set foot on it. Or, we have glass ice and no wind. Traveling in winter conditions is also a part of the sport, sometimes arriving at a site that is no longer in raceable condition. Setting up in bitter cold, waiting for the wind to come up or go down — all for the thrill of racing a maximum of four competitive races a day, each lasting approximately six minutes. However, the thrill of the race, the feeling that sweeps over you as your boat accelerates has been unmatched by anything I have tried and is a feeling shared by most other iceboaters, regardless of the class they sail in.

Bill Mattison has been one of the most consistent iceboat champions over the past two decades, compiling a record that includes eight wins at the International Skeeter Association championship. He is also well-known for his boatbuilding ability, and spends summers racing E Scows.

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The class E Skeeter is an open class that has been established for close to 40 years. It is bow-steering and the *only* specification in the class is a maximum of 75 square feet of sail with a maximum 12-inch roach. Yet, after 40 years of development and testing, the top competitors' boats are all quite similar. My present boat, *Honeybucket VII,* has a 24-foot hull with a six-foot springboard, a runnerplank that is 19 feet long by 12 inches wide and a 24-foot spar. The total weight of the boat is 550 pounds. Most other current competitive "E"s are within six inches of each of these dimensions and within 50 to 85 pounds in overall weight.

It is important to build your boat or have it built to your individual weight, so you can achieve the correct deflections to make it work with you. If the combination of runnerplank and springboard is too rigid, the boat will want to hike up too quickly, but if it is too soft, a little drag on rough ice may tear it apart. In recent years, the fuselages have been made with bulkhead and chine construction, although there are now excellent fiberglass hulls coming into the sport. The planks and masts are made of hollow sitka spruce. (For the given amount of compression load the spar carries, spruce is lighter and stronger than aluminum.) The boats are all painted with a very hard finish, such as Imron, and polished highly with any good auto polish, all aimed at cutting down wind resistance.

I enjoy the building of my boats, and anyone who is capable of doing this is ultimately a better sailor, as they develop a better understanding of how to achieve the feel they need for optimum speed and are able to translate that understanding into the changes necessary for this achievement. A comprehensive set of plans and measurements have been developed over the years, and you need only moderate skill to build your own E. Building an E will take between 800 and 1,000 hours, depending on shop equipment and skill, and the materials will run you between $3,500 and $4,000.

Since the only parameters relate to the sail, the spar is the logical starting point in the design process. Over the years, as sail materials evolved from cotton up to the present Dacron, which is much more stable, it allowed us to lengthen the spars from their original height of 18 feet to the current height of 24 feet. Although some have been higher, they have come back to this height because when you go up in height, you must go shorter on the boom to maintain 75 square feet of sail. And if you maintain the optimum angle of 90 degrees from the foot of the sail to the leech as the spar gets taller than 24 feet, the top of the sail would extend beyond the clew and would be uncontrollable (see diagram). The only way you could go higher and maintain this 90-degree angle would be to straighten the rake, but this forces the center of effort too far forward, creating a leeward helm. By moving the spar back on the hull, you could maintain the desired angle and rebalance the boat, but this setup would *only* be good in light air. Since the spar has no spreaders and only one attachment point for both shrouds and headstay, the taller the mast and the harder it blows, the more likely it will be that mast bend will become uncontrollable. We try to achieve a position for all-around conditions. My boat is well balanced with a 23-foot headstay, eight feet of mast rake and the mast heel located eight feet in front of the center of the runnerplank.

When competing in regattas we are only allowed two sails. In choosing a sail, aim right down the middle for a good average in all conditions, not too drafty or too flat. I find it best to carry a one-inch draft cut in the luff one-third of the way up, tapering to nothing at the top. The sail is made of 10- to 12-ounce Dacron and is fitted with full-length battens on two-foot centers down the entire sail, which has no broadseaming. Normal equipment includes three sets of ash battens — one set for light, one for medium and another for heavy air. They are one and three-quarters of an inch wide and three-eighths of an inch thick at the aft end, tapering at the front edge in varying degrees to achieve the correct flexibility for controlling draft. In light air, when more draft, and thus more flexibility, is called for, the battens taper to three-thirty-seconds of an inch at the front edge. As the wind picks up greater stiffness (less taper) is needed.

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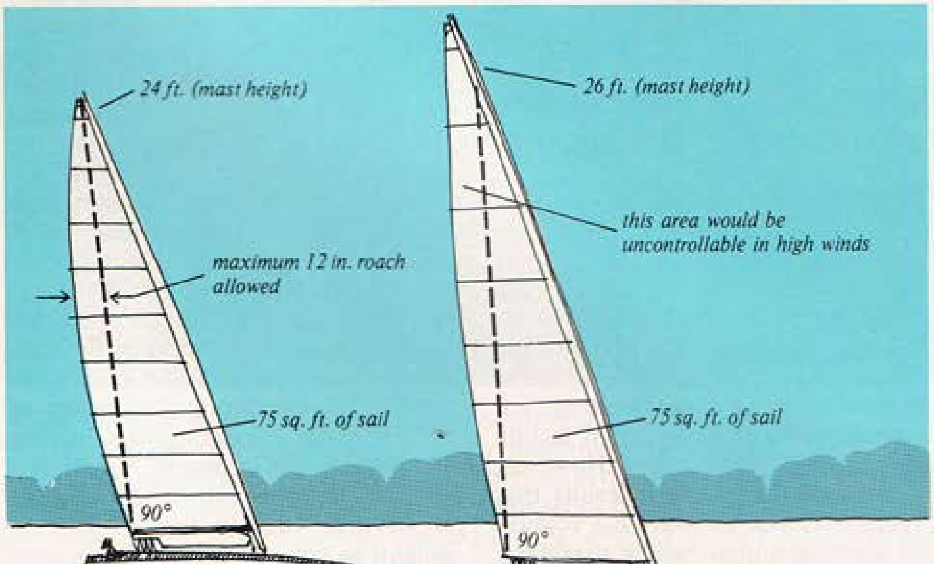
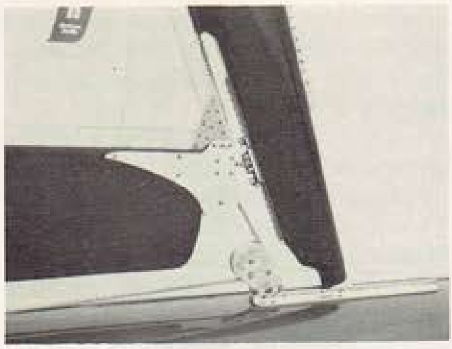


It is important to have the sail and the spar work together as a single unit. The spar can be added to or shaved if necessary in order to get it to perform correctly. If it is too stiff when a puff hits it, the boat will hike up instead of accelerate forward, and if it is too soft, it will bend to leeward when a puff hits and again the boat will not accelerate forward. There is also the possibility of the spar breaking. So the object is to have the mast bend enough to absorb the initial puff, but also drive the boat forward.

The location of the hounds is also critical. On an E, the shrouds and headstay are all connected to a nine-inch link of stainless steel attached to the front of the mast to allow the mast to rotate freely (see diagram). This link should be attached to the mast so that the sail will flatten uniformly as the mast bends. If it is too low, the top of the mast will bend to leeward and the leech will fall off and be too loose. If it is too high, the spar will bend too much down low, causing too much stress on the link. To correct for this, the spar would have to be made so stiff to prevent breaking that it would not perform correctly. The average placement on a 24-foot spar is 16 feet, six inches from the base.

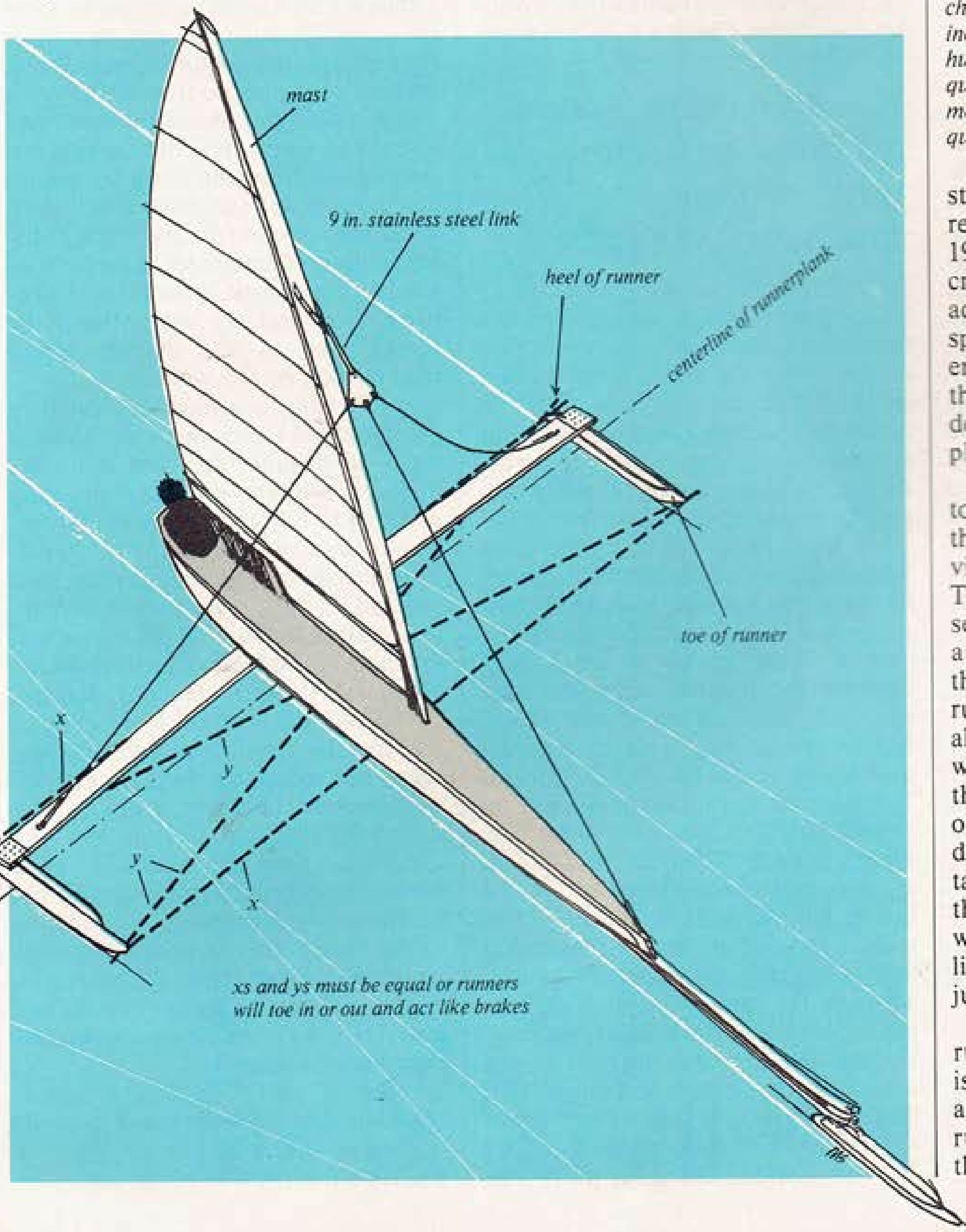
As the spars developed from 18 to 24 feet, the runnerplanks had to get longer and wider to keep the platform

A springboard increases the length of the hull without adding much extra weight, and the spring front end fitting used to attach the springboard to the front runner allows the forward end of the boat to go down level with the aft end when the runnerplank deflects downward under pressure. Without this, when the runnerplank levels under load, the front end of the boat would be higher than the back, creating an uneven distribution of weight on all three runners. Bill Mattison photo



The gooseneck has a pin in it so that as you trim the 12:1 sheetrope (mainsheet), the downhaul slides down and the pin engages to prevent it from sliding up when the main is eased. In heavy wind I choose to have more downhaul, so I have a lever, which I carry in the cockpit, and use it to ratchet more downhaul on the gooseneck. In light wind I release the pin to let it slide freely, with a preventer to keep it from going up too far when the main is eased. Bill Mattison photo

The average runners are 44 inches long, four inches high, one-quarter of an inch thick, and are ground to a 90-degree, extremely sharp edge. For soft ice or slush conditions the edge is somewhat dulled with a hone so you won't penetrate so much. Longer runners, up to 52 inches in length, are used for more support on soft ice so the boat doesn't sink in, while the shorter runners give more bite on hard ice so the boat won't slide. If the runners are higher than four inches you get more vibration and chatter, and if they are shorter than four inches, the runner plank and the bottom of the hull drag. A thickness of more than one-quarter of an inch would be heavier and have more drag, and runners thinner than one-quarter of an inch would bend. Bill Mattison photo



stable. Hulls also had to get longer to regain fore and aft stability. In about 1946, springboards were added to increase the length of the hull without adding extra weight to it. The springboard also allows the forward end of the boat to go down level with the aft end when the runnerplank deflects downward under pressure (see photo).

Runners are ground, hardened, tool steel and have stiffeners alongside them to keep them from bending or vibrating and chattering (see photo). They are mounted to the plank with a set of "pillow block bearings" with a five-eighth-inch shaft that goes through a shoe mounted on top of the runner. The pillow block bearings allow the runner to go up and down with very little friction and also allow the runners to be lined up one to the other on parallels and diagonals (see diagram), which is extremely important, for if the runners toe in or out they will act like brakes. This condition would be particularly disastrous in light wind or at starts when the boat is just beginning to accelerate.

Likewise, it is important that the runnerplank is square to the hull. This is achieved with framing stays, which are wires on each side of the boat that run from the front of the fuselage to the outboard end of the runnerplank.

These wires should be taut with no slop, but not so tight as to strain against either end. At rest, the runnerplank has about six inches of crown (round) and this goes level or one to two inches below level when the boat is under heavy pressure. Therefore, if these wires are too tight, when the runnerplank goes level they become even tighter, causing the runners to toe in. If they are too loose, the plank will work under the hull and the stays will oscillate, sending an unwanted vibration throughout the whole boat.

Generally, I achieve the correct set of the sail through outhaul and downhaul adjustment prior to the race, for once the race is on, it's just your steering, your sheetrope (mainsheet) and you. The outhaul is pulled out and pinned in one of the various holes that are built into the outboard end fitting. No purchase system is required since the sails are so tough you can't pull them out very far and because you can't adjust it during the race. The downhaul, however, is affected by the mainsheet trim so I have a combination-type gooseneck that can slide freely in relation to the sheetrope trim in lighter air or be ratcheted down and locked, in heavier air (see photo). Combined with three sets of battens, this system helps me to get by with one sail, as I can change the shape significantly.

Iceboat races are sailed windward-leeward (marks to port), and since the finish is downwind, the leeward leg is the most important. I therefore set up or tune, gearing for optimum speed downwind. This is accomplished primarily with the shrouds. The shrouds are around 19 feet long and have eyes swaged on them. These go into 12-inch stainless steel tubes which have holes on one-inch centers, allowing for easy adjustment with fast pins. Set up the boat so that when going to weather you have the feeling that you must fight the boat to keep it from becoming airborne. In light air this is accomplished by tightening the shrouds, loosening them as it gets heavier. The shroud adjustment from light air to very heavy air can vary as much as six inches. However, when adjusting the shrouds, you have to allow for the leveling of the runnerplank. Consequently, when the shrouds are at their maximum looseness I can achieve up to a five-foot side slop on the mast. I should also point out here that this is why steering is so critical, since the boat is under so much compression that it can literally explode. Make sure the steering cables are snug enough so that steering is not sloppy.

Every iceboat is fast. But it is only up against another boat that you can fine-tune to get optimum speed. Since we use standing starts, it's easy to match race a fellow iceboater to check out your boat. We take off, round a course, look at our own boat, our fellow racer's boat, then come in to the starting area, make the changes necessary and try the new settings another time around. Our club members will even swap rigs and runners with each other to gauge their boat's performance.

Before an actual race, get to the starting area well ahead of time, but for safety, never explore unknown areas. Sail the course before the race, getting the feel of your boat under the prevailing conditions. Check for drifted snow or particularly rough ice and find the best route, making plans to avoid particular areas. On small lakes certain shore effects may alter wind direction or velocity so check this out also. For telltales look at snow blowing across the ice, ice chips coming off other runners or smoke on the shoreline.

> *"... once the race is on, it's just your steering, your sheetrope (mainsheet) and you."*

I try to make my starts the same way each time, but in light wind I may increase the number of strides (normally four to five) before entering the cockpit. And in heavy air I may decrease the number, since the boat practically takes off out of your hands. For better traction, I wear ice creepers over rubber boots. To enter the cockpit I step up on the runnerplank and in, smoothly, with a minimum of bounce. I don't jump in. The boat must be laid off correctly, about 45 degrees. Allow the maximum draft in the sail, then trim it in another foot or foot-and-a-half to compensate for the difference between the true wind and the apparent wind once the boat gets moving. For the first 100 yards the boat is very sensitive to sheet trim and angle. You also have to be very conscious of other starters while still maintaining proper sail trim. And if the air is puffy you have to be able to trim fast enough so you don't trim behind the puff.

With so much speed, oversteering can be a problem. Any movement must be very deliberate and very smooth. On approaching the top mark be prepared to ease the main as the boat hikes up. On a windy day it's a deathtrap if you are sideways to the wind for more than a few seconds. Once around the mark, keep forcing the boat downwind, but not so far that you lose acceleration. To achieve maximum downwind speed you have to fishtail the boat — up a little, down a little.

Mark rounding is another area that deserves attention. At the top mark, the most common mistake I see is overstanding. At the speed we travel a second makes quite a difference. However, this is something that any iceboater can practice anytime he's out for a sail. Practice can also help your rounding at the bottom mark. When making your jibe, do it in a very wide arc so you don't shake the boat and lose speed. Come in a considerable distance away from the mark so that as you harden up, you have your windward runner close to the mark. This keeps your competition to leeward of you, or if someone attempts to go between you and the mark they'll be forced way to the outside before they're back on the wind.

Everyone is always interested in the speed we travel. Since the average eight- to 10-mile race lasts about six minutes, we are generally traveling about 80 to 100 miles per hour. The officially clocked top speed is 145 m.p.h. Though this may sound exciting, bear in mind that you're in an open cockpit, your duff is four inches off the ice and ice chips are flying in your face. Many times you'll hear someone remark, "that's too fast for me." Keep in mind also that the boats are not designed for beam run speed, but for racing windward-leeward. Neither are they designed for the ultimate in any one condition, but rather for a good average in all conditions, as that's what we have in the Midwest. (Competing in the East, it may be noted, the boats are much lighter, normally sailed on clearer ice and in lighter winds, and thus they may set up and construct their boats differently.)

But if you're bold and knowledgeable and an opportunity prevails to take up racing on the ice, give it a try. It's a thrill you won't forget. •