BOAT Pennsylvania

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VIEWPOINT

Personal Watercraft: A New Dilemma

The numbers are in. Over 270,000 boats were registered in 1988, an increase of more than 8 percent over last year's numbers. Over 12,000 model-year 1988 boats were registered, and already more than 500 model-year 1989 boats carry Pennsylvania registration numbers. These numbers will increase slightly over the next several weeks as returns from dealers trickle in, but the figures speak for themselves.

Boating is big.

Pennsylvania ranks 14th in the nation in the total number of registered boats, despite our relatively short season and the lack of really big boating waters. This is perhaps reflected in the large percentage of boats that are less than 16 feet in length.

The class of boats we call personal watercraft is experiencing tremendous growth. In 1987, 1,400 Kawasaki Jet Skis were registered. In 1988, over 2,000 of these motorcycles on water were registered. This is an increase of over 35 percent in one year and this increase is expected to continue in the future.

The Jet Ski is a fabulously exciting craft to watch and to operate. It takes athletic skill to operate one of these devices and it is a distinct thrill to watch someone who knows what he is doing.

Unfortunately, not everyone who rides a personal watercraft is athletic. More unfortunate still is that a large percentage of these operators are not boaters, or at least they do not recognize themselves as such. They do not understand right of way or courtesy on the water. They do not know the basic rules of boat operation. As a result, conflicts between this new breed of boaters and traditional boaters are on the increase.

Jumping Jet Skis is great fun for those who can do it. On the ocean, operators jump waves. On inland lakes, operators use the only waves available to them—the wakes of other boats. On the surface this seems to be innocuous enough especially to any Jet Ski operator who is not familiar with the operation of a traditional boat. They do not realize that any small, seven-foot boat flitting around a larger boat is an annoyance and is in fact dangerous. It's like a motorcyclist playing tag with an 18-wheeler. No cyclist in his right mind would do that, but it happens all the time with Jet Ski operators.

The Jet Ski is not a toy. It can be lethal. During the 1988 boating season, 13 people lost their lives as a result of boating accidents. Two of these were operators of Jet Skis. Serious injuries also were reported where Jet Ski operators ran into other boats or into each other. This is a large percentage, considering the total number of these boats that are on the water.

Inexperience, lack of training and lack of athletic ability are the primary causes of these accidents. One of the 1988 fatalities involved two rental craft. The second fatality occurred on a boat that was acquired by the operator only one month before the accident. Jet Skis are not to be played around with. They must be treated with the same respect any motorized vehicle is given.

If you drive a Jet Ski, drive it sensibly. If you observe a Jet Ski operating near your boat, keep a careful eye out for what it is doing. These craft are maneuverable in the hands of an experienced operator, but unfortunately most of our operators are not experienced and one miscalculation can place that boat right in the way of your boat.

No matter what you think of these boats or their operators, the last thing any of us wants to do is to kill or injure a fellow boater. So please be careful. Keep a good lookout and let's have a safe boating season in 1989.

John Simmons
Director
Bureau of Boating
Pennsylvania Fish Commission

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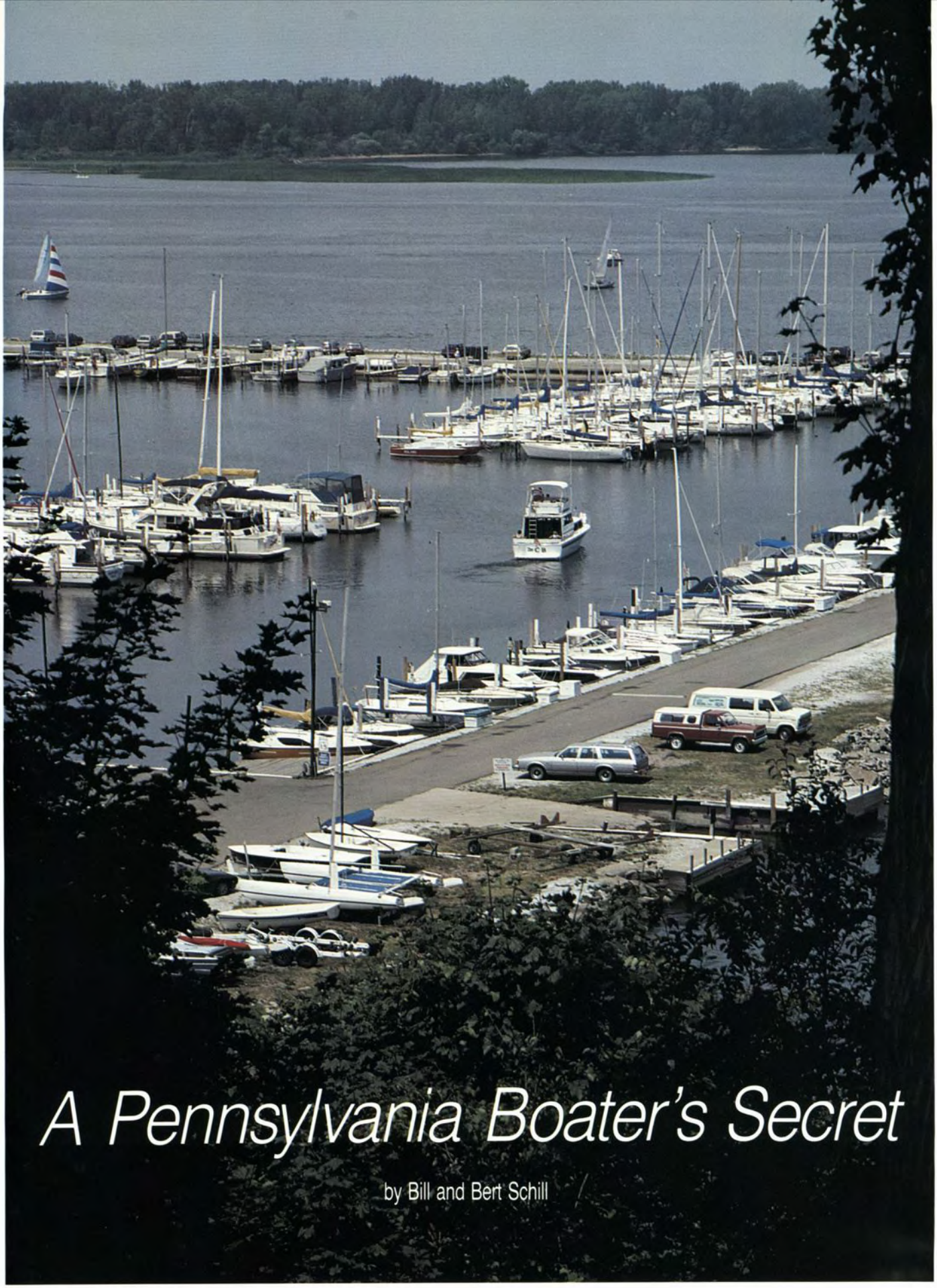
The covers

The bow deck on this issue's front cover was photographed in Erie by Paul Jenkins. For a similarly unique look at two new aspects of boating, turn to pages 8 and 25. Glimpse the past in pictures of paddlewheelers on page 16. If you trailer a boat, better check out page 12, and if iceboating gives you thrills and chills, turn to page 28.

The boat on this issue's back cover was also photographed in Erie by Paul Jenkins.



A Pennsylvania Boater's Secret

by Bill and Bert Schill

Bill and Bert Schill

One of Pennsylvania's best-kept secrets is the fabulous boating possibilities in the northwestern section of the state around Erie. The protected waters of Presque Isle Bay wash the city's shoreline and offer enjoyable opportunities for boats of every size, with no restrictions on motors. At the upper end of Presque Isle Peninsula there are quiet waters in which to cast a line or just leisurely explore. However, for the more adventuresome, wide-open Lake Erie provides blue-water sailing, hours of cruising and fishing in an area the size of Vermont.

This water-oriented city also has ties to the "derring-do" exploits of famous seamen in the early history of our country. During the War of 1812, six ships were commissioned to be built at Erie, but because the population of the town was very small, shipwrights, caulkers and general laborers were imported from other sections of Pennsylvania to provide a fleet to face the British.

In March 1813, Commodore Oliver Hazard Perry took command and the vessels were completed. The British had the harbor blockaded but withdrew on August 1, enabling Perry's ships to sail into Lake Erie where his crews were trained while they kept a close watch on the British squadron near the mouth of the Detroit River.

On September 10, the British fleet, under the command of Commodore Robert Heriot Barclay, and the Americans engaged in a battle near Put-in-Bay, Ohio, where Perry's *Lawrence* was totally destroyed and 80 percent of his crew either killed or wounded. The Americans' *Niagara,* under the command of Lieutenant Jesse Elliott, had not participated in a close engagement with the British, so Perry transferred his command to her and raised his battle flag with the famous words, "Don't give up the ship."

Reentering the battle, the American fleet was successful and the British were forced to surrender. Following the engagement, Perry wrote his famous report, stating, "We have met the enemy and they are ours."

At present, the flagship *Niagara* has been restored and again, shipwrights were brought in, this time from around the country, to make her as historically accurate as possible. Now that work is completed, and the *Niagara* is a floating museum.

A statue of Commodore Perry stands in Perry Square, on State Street, and although not connected with boating, another figure with historic ties to Erie, the colorful Revolutionary War General "Mad" Anthony Wayne, built forts and roads throughout the territory south of the Great Lakes during the Indian uprisings. A replica of one of his original blockhouses stands on the site of his first grave on the grounds of the Pennsylvania Soldiers and Sailors Home. His bones were later removed to a grave site in Wayne, PA.

Bill and Bert Schill

There are several marinas around Erie and the Presque Isle Peninsula with excellent, well-maintained facilities. Anyone trailering a boat to this area will find numerous launch ramps with ample parking spaces for cars and trailers.

Erie has two yacht clubs, and at the time we were visiting a M.O.R.C. (Midget Ocean Racing Club), Presque Isle Station 31, regatta was held, sailing from the Erie Yacht Club to Ashtabula, Ohio. Races are started as nearly as possible downwind (square to the mark) usually right in front of the yacht club, giving spectators a good view of the excitement of maneuvering strategies.

This particular race started off in dreary weather with thunder and lightning and heavy dark clouds threatening to wipe out the race. However, the intrepid skippers were able to start this 40.7 nautical mile race, with a 13-hour time limit, on time. Sailing out of Presque Isle Bay through the entrance channel into Lake Erie, they disappeared at times in the mist, but were able to complete the first leg of the course, arriving at Ashtabula, where they moored overnight. The return course was 36.7 nautical miles with a time limit of 12 hours.

When the racers return to the finish line, if the committee boat is not on station, they take their own time filling out a form with the following information: name of the race, yacht name, time at the start in hours, minutes and seconds; time at the finish, difference in times, plus the name of the yacht behind the finish time of that yacht. The skipper then signs the form and turns it in to the committee so it can determine the winners.

During the sailing season there are several trophies awarded for races, such as the Mork Trophy, Gilmore Cup, Annette Cup, Past Commodores Race, Summer Evening Series, Fall Evening Series, Bluff Bar Race and the Eckard Cup, plus the Zurn Trophy for "Boat of the Year."

Skippers have a penchant for naming their yachts after people near and dear to them or for some event that has impressed them. A few of the interesting names floating around the Erie Yacht Club are *Outlaw, Dr. Zook, Rhumb Runner, Sushi, Marylou,* and *Tomfoolery.*

As stated in the fleet's handbook, the M.O.R.C. primary objective is "To promote medium and long distance racing and cruising throughout the United States and internationally among sailing yachts below 30 feet length overall, to encourage the development of yachts suitable for this

Bill and Bert Schill

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purpose, to formulate and administer rules for the rating of such yachts, to advance the tenets of safe seamanship and good sportsmanship and to collect and disseminate information related to those ends."

Commodore of M.O.R.C. Station 31 is David Heitzenrater of Erie, who sails *Blackwatch,* a Class B yacht. There are three classes of registered M.O.R.C. yachts, with auxiliary power: A, B and C.

Even though the storm was threatening, the Erie sailors had the advantage of having learned how to operate their boats in this largest open body of water in Pennsylvania. This applies not just for rag sailors but also for motorboat operators. "Putting" around Presque Isle Bay when the weather is good and the waters of the lake calm not only helps the tyro gain confidence but helps him, little by little, to venture out in less-than-ideal conditions to learn just how much heavy weather he and his boat can handle.

The U.S. Coast Guard maintains a station at the entrance channel from Lake Erie into Presque Isle Bay. Equipped to handle any emergency, they keep an ever-watchful eye over the boating activities on the lake.

Skippers whose boats are equipped with Loran C have the advantage of repositioning themselves over a previous fishing "hot spot" with very little effort. Due to the great depth of water offshore, the use of downriggers is recommended to return to shore with a satisfying catch.

To experience deepwater fishing under professional guidance, there are charter boats available equipped with modern electronic gear, such as sonar graph recorders, multiple downriggers and all the necessary fishing tackle.

An added attraction at Erie is for skippers to take their families on a narrated tour of Presque Isle Bay and out into Lake Erie on the *Little Toot,* a sightseeing sternwheeler berthed at Dobbins Landing, the public dock. The dock also has an upper deck where a panorama of the bay's activities can be enjoyed by visitors.

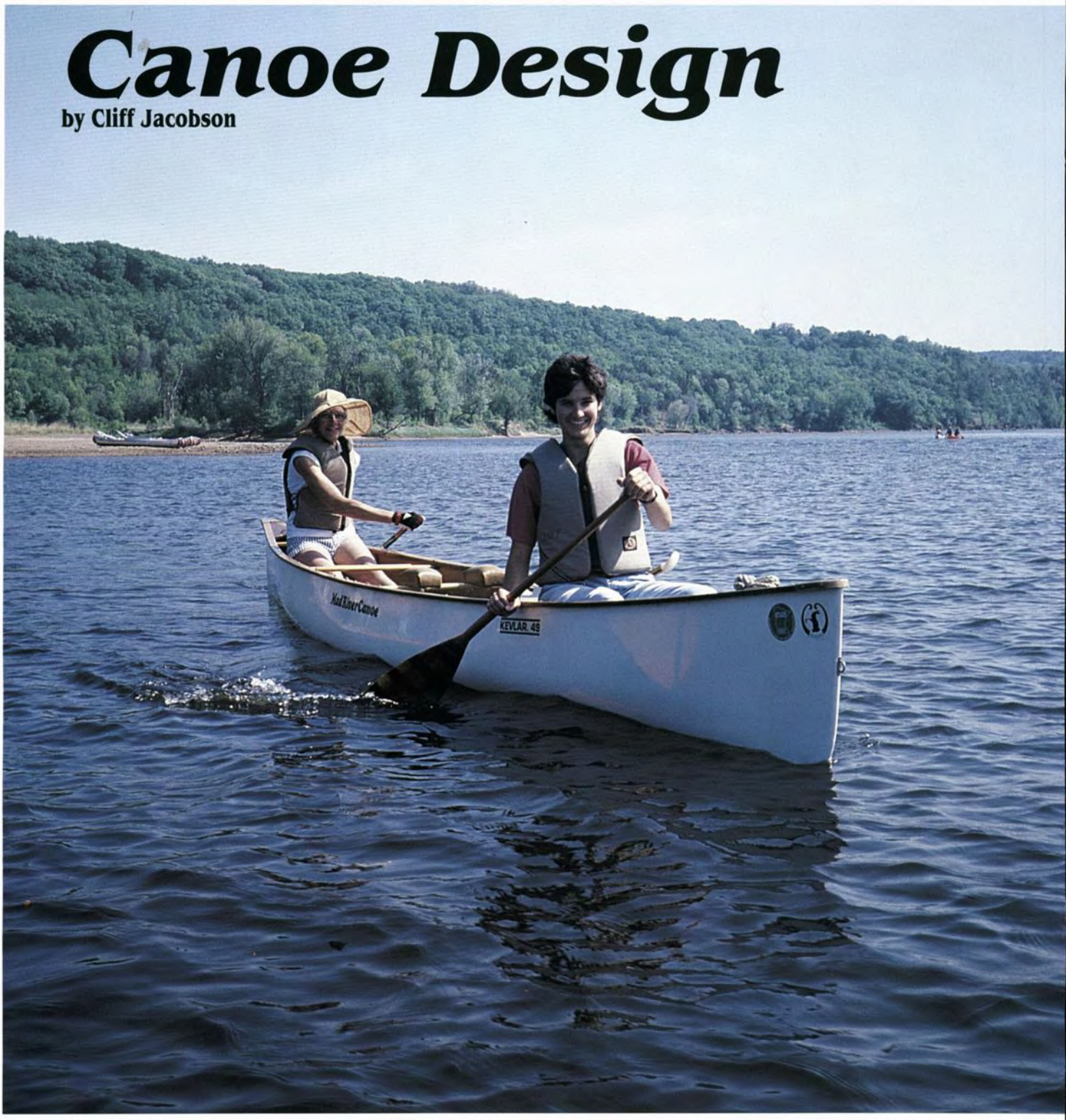
Erie is a great destination for boating of all sorts, and the area offers something for every member of the family: fishing, swimming, camping and the experience of being in an area that was involved in one of America's great naval victories.

This well-kept secret really should be visited and shared, not only for its place in history, but for the enjoyment that can be experienced on one of Pennsylvania's finest bodies of water.

Learn to tell the treasures from the trash.

What's New in Canoe Design

by Cliff Jacobson



There's nothing really "new" in canoe design. The first Americans knew all about asymmetric hulls, flared bows and hollowed entries. But know-how is one thing; a working boat is another. Bark and skin boats relied heavily on "stressed" construction to maintain their integrity. Canoe designs of the 18th century evolved to the limits imposed by wet birch bark, steamed spruce and filled canvas.

Nonetheless, evidence suggests that Indian canoe makers understood most of the design principles we take for granted. They simply lacked the waterproof glues and functional materials necessary to realize their dreams.

Despite material setbacks, Indian craftsmen produced remarkably good canoes, many of which, if built today with modern fabrics and technology, would put to shame the majority of mass-produced craft. Fact is, most of today's canoes are neither well-designed nor built well. Instead, they're priced to sell!

You won't find good canoes at your local marina or discount store. They're on proud display at outdoor specialty shops and in the catalogs of the best canoe makers. Here's how to tell the treasure from the trash.

Length

Length, more than any other variable, determines a canoe's performance. Canoes are displacement hulls; their maximum speed is a function of length. The longer the canoe, the faster it runs, and vice versa. You can calculate the relationship according to the over-simplified formula:

$$S = 1.5 \times WL$$

S = speed in miles per hour, and WL = the *waterline* length in feet.

Simple calculation reveals that an 18 1/2-foot canoe tops out at around 6.7 miles an hour, while a 16-footer runs about 6.2 miles per hour—a 7 1/2 percent difference that becomes meaningful at the end of an eight-hour day, or when you're bucking a head wind.

However, speed and ease of paddling are not the same. Some canoes feel fast but aren't. Others that are fast may seem slow. The perceptive differences can be quite pronounced, especially when you compare two identical canoes of different weights.

This is a major reason why so many people buy short canoes instead of long ones. At an easy cruising speed of around 3 miles an hour, a light 16-foot canoe will usually feel faster—and paddle easier—than a heavier 18-footer. But push both boats hard and the shorter craft will bog down in its bow wave while the longer canoe slices cleanly along, well below hull speed.

Asymmetry

The displacement formula breaks down in shallow water because a hard-pushed canoe produces a substantial bow wave that is difficult to climb over. Racers refer to this phenomenon as "climbing," and they counteract it by paddling canoes that have long, narrow bows (to cut the water better) and fat, buoyant sterns (for better flotation in the wave trough). This "asymmetric" hull shape (see figure 1) produces greater speed on any water, especially that which is less than 2-3 feet deep.

Asymmetric canoes are great for flatwater cruising, but they are often skittish and unpredictable in tricky currents. So if whitewater is your game, avoid them.

Cliff Jacobson

Shipshape

End shape also determines a canoe's personality. Canoes with narrow ends paddle easily, but they often submarine in waves. Buff-bowed canoes rise confidently above waves but they are slow to paddle. Fortunately, you can maximize both variables if you combine fine ends below the waterline with flared bows—to direct water away from the boat—above the waterline. Naval ships are all designed this way, as are the very best canoes.

Carrying capacity

Carrying capacity is the amount of weight a canoe can safely carry. Manufacturers usually state the figure in pounds, to a "6-inch freeboard." A canoe loaded this heavily may be okay for day trips on the Susquehanna, but not for running whitewater on the Youghiogheny!

Manufacturer capacity figures are largely a joke—the result of formula calculations rather than water tests. For example, one popular 17-footer boasts a carrying capacity of 1,000 pounds, a load that would surely sink it at the dock! Besides, capacity figures tell you nothing about how the canoe will perform when loaded. Canoes C and D in figure 2 have the same carrying capacity, but this is all they have in common.

Note from figure 3 that nearly all the carrying capacity of a canoe is borne amidships, in the middle two-thirds of the hull. Canoe A (figure 3) will carry a greater load than B, but B will be easier to paddle. If you want to increase capacity, you have to widen the beam or carry the existing beam farther forward. If you do that, you'll lose speed. The answer is to lengthen the craft. Note that it is impossible to improve on one variable without changing the other! That, in a nutshell, is why long canoes paddle best.

Stability, bottom shape

Canoe catalogs and magazine spec charts usually give "beam" (width) measurements at only one point—the widest part of the hull. And that's unfortunate because this figure tells you nothing about performance.

Canoe enthusiasts, on the other hand, measure width at four places: The gunnels or rails; the "widest point" (called "maximum beam"); and the 3-inch and 4-inch working waterlines. Of these statistics, the gunnel and 4-inch measurements are most meaningful.

The "gunnel beam" tells you how far you'll have to reach over the sides to paddle. Narrow hulls provide an easy reach and are therefore most comfortable to paddle. Put the maximum beam at the waterline and you'll have a very stable craft to fish from. Place it at gunnel height and you'll have an impossibly wide (to paddle), tippy beast, but one that becomes more stable as it is leaned. Manufacturer specifications are only meaningful if you understand this idea.

Basically, waterline measurements provide a key to the amount of wetted hull surface. The less wetted surface (the rounder the hull), the faster the boat, and vice versa.

Minnesota and Quebec racing canoes are built to a formula that translates to a minimum beam of 27 inches at the 3-inch waterline. U.S. Canoe Association (USCA) specs are more generous: The bottom can measure 32 inches wide at the 4-inch waterline.

If you love fast cruising, look hard at canoes that approximate

USCA specifications. For wilderness tripping, you can add an extra inch or two. Most "ma and pa" utility canoes run 35 or more inches wide at the 4-inch working waterline. No wonder they are such pigs to paddle!

Tumblehome

The inward curve of a canoe's sides above the waterline is called "tumblehome." It is used for these reasons:

- The canoe can be made wide at the waterline for stability and narrow at the rails for ease of paddling.
- Curved sidewalls are more rigid than broad, flat areas. The alternative to curved sides may be a number of ribs and cross braces, all of which add weight, clutter and ugliness.

You'll find varying amounts of tumblehome on the best modern canoes, for the reasons cited. However, the most seaworthy configuration of any watercraft is a fully flared design (as exemplified by a wild-river dory), which deflects waves away from the boat rather than into it.

Unfortunately, fully flared (no tumblehome) canoes are often too narrow (tippy) at the waterline for comfort. So canoe designers respond by widening the bottom, tumbling home the center for ease of paddling, and flaring the rest of the hull for seaworthiness. If you've ever paddled the typical buff-bowed, tumble-sided aluminum canoe in rough chop, you'll understand the rationale. The metal canoe will pound and splash with every wave, while a similar canoe with tumbled belly and fine, flared ends will run quiet and dry in the same waters.

Going from extreme tumblehome at center to substantial flare in the ends (especially in a short canoe) tests the limits of the canoe builder's art. Some materials, like aluminum, can't be economically formed into the complex curves that spell "high performance." The result is that metal boats lean to the traditional—solid citizens all, but awful performers on every type of water.

Then there's the matter of bottom shape. Again, "wetted surface" comes into play. The rounder the hull, the less the wetted surface, and the faster the boat. If you want speed, opt for a round or vee-shaped design. For fishing and photography, less adventurous canoes are warranted.

It's important to realize that the stability you enjoy when sitting on a dead-flat surface (flat-bottom canoe) turns to instability in a rough sea. Heel a flat-bottomed canoe to the bilge and it will instantly turn turtle. Do the same with a round-bottomed, fully flared hull and it will remain upright and become more stable. Rationale: the wetted surface of a flared hull increases as it is leaned. It does the opposite in a tumblehomed design, markedly so when the craft is heeled past the bilge—the point of "no return."

In summary, round or vee-bottom canoes are best for use on all types of water. Flat-bottom canoes excel only when sitting stationary on quiet water.

Inferior addition

A keel makes any canoe "track" (hold its course) better. It also increases the draft of the boat and catches on rocks in rapids.

There's smug satisfaction in watching your buddies spill when the keel of their canoe catches on the same rock your keel-less canoe just slid quietly over. Later on, when your friends have dried out, you can boast that your prowess in the rapids was due to your impeccable paddling skills, not how your boat was set up.

The real reason for keels is to stiffen a floppy canoe bottom. A piece of flat, lifeless material becomes instantly rigid when you attach a piece of T-shaped aluminum or a one-by-two along its length. Throw in a bunch of ribs and vertical struts and you'll stiffen the most shapeless hull.

If you want "good tracking," combine a round or vee-bottom with fine, hollowed ends. Keels are the one feature you will never find in good canoes. The Indian and fur trade canoes did not have keels, and neither should yours.

Rocker

The fore and aft upward curve of the keel line at the ends of a canoe is called "rocker." Some canoes have lots of rocker, others have none at all. Rocker is used for two reasons:

- It frees the stems (extreme ends) of the canoe from water pressure and allows the craft to turn more easily.
- A rockered canoe rises more easily to oncoming waves than a canoe without rocker.

It would seem that lots of rocker is a very good deal. Not so. Too much rocker spells crankiness in a rough sea and makes the canoe difficult to paddle straight on calm water.

Racers like a canoe with zero rocker, perhaps a hint of lift at the bow. For trips on forgiving waters, an inch of rocker at each end is enough. And for whitewater, the more lift, the merrier. Some slalom designs have over six inches of rocker!

All you need to check the rocker of a canoe is a dead flat surface and a ruler. You'll keep things in perspective if you remember that one variable can modify another. For example, long, fine ends won't produce good speed if they're rockered heavily upward. By the same token, it's pointless to combine a tumblehomed buff bow with a straight keel line. Such a canoe would be neither fast nor would it turn on command.

Depth

Canoe makers commonly specify depth at two places—the center and the ends. Except for flatwater racing, shallow center depth (less than 12 1/2 inches) is always a mistake. I prefer a minimum of 13 1/2 inches of depth for family cruising, and an inch more for whitewater and wilderness tripping. Canoes almost always take water back of the bow paddler or at the waist. High ends won't keep out water unless they're combined with proportionally high sides.

However, ends that are too high make canoe handling in wind difficult. The rule of thumb is that ends should be no higher than the center depth of the canoe plus 10 inches. Thus, a 13-inch deep canoe should have a maximum end height of 23 inches. Take a ruler with you when you go canoe shopping!

It's important to realize that increasing the height of a canoe's sides doesn't necessarily improve its seaworthiness. Rough-water performance is a function of canoe design—bottom and end shape, flare and tumblehome, etc. If you want to know how the canoe will react in water, simulate the flow with your hand. Does your hand curve in with the tumblehome? If so, water will follow. Flare directs water away from the canoe. Tumblehome allows it to pour in!

Weight

The lighter the canoe, the better. However, don't let light weight overrule your need for durability. Look hard at any 17-foot pleasure canoe that weighs much less than 50 honest pounds. Either the manufacturer is lying about its weight or the strength isn't there. Take a bathroom scale with you when you

go canoe shopping!

Rules to abide by

- All things equal, the longer the canoe, the faster it runs. Short canoes usually turn more easily than long canoes. They also "fit" between waves better and so may be more seaworthy in rapids. If you want a fast canoe, especially in shallow water, choose an "asymmetric" hull shape. Asymmetric canoes, however, tend to be fickle in strong currents—reason enough not to select them for use in whitewater.
- If you want to race, choose a craft that meets the appropriate race class specifications.
- Stability, ease of paddling and seaworthiness are a function of hull shape. Except for fishing, the vote goes to round or vee-bottoms for use on all types of water.
- Tumblehome is a necessary evil. However, it should not be carried too far forward or aft, as is the case in aluminum canoes. Better to flare the bows so they'll deflect water away from the canoe, rather than provide a path into it.
- Keels are an abomination on any canoe. Good canoes don't have keels. Period!
- Figure on zero rocker for a racing canoe; one-half to one inch for a recreational cruiser; one to two inches for a wilderness tripper, and up to eight inches for an all-out whitewater boat. Note that short canoes need less rocker than long canoes. Solo boats under 14 1/2 feet are probably best straight-keeled. Measure the rocker of any canoe you plan to buy.
- Manufacturer capacity ratings are generally meaningless. If you want a load carrier, opt for a shape that carries its beam well forward and aft. If you want speed, specify fine, hollowed ends and a relatively straight keel line. And if you want to maximize both variables, select a beamy 18 1/2 foot canoe with "fast" lines.
- Choose an ultralight canoe only if durability is not a prime concern.

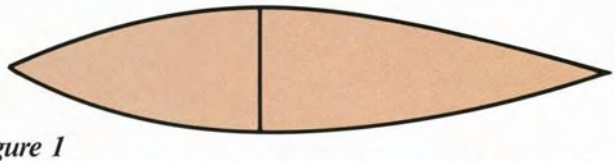


Figure 1
Asymmetric canoe. Note long, narrow bow and fat, buoyant stern.

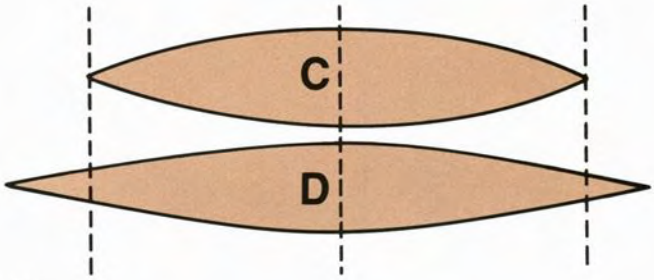


Figure 2
Canoes C and D have the same carrying capacity—which is all they have in common!

Figure 3
Nearly all the carrying capacity of a canoe is borne amidships, in the middle two-thirds of the hull. Canoe A will carry the load better than B because its fat buoyant ends will ride up over the waves rather than knife through them. But B is easier to paddle.

The inward curve of the gunnels above the waterline is called "tumblehome."

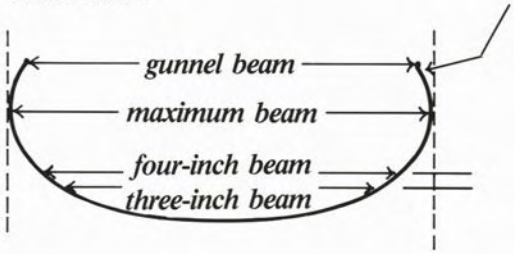
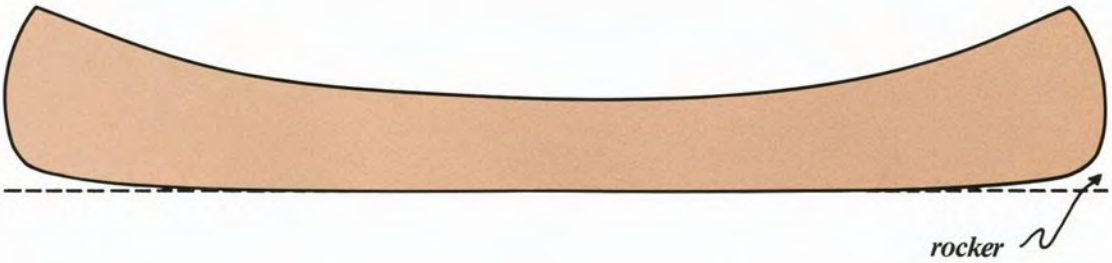


Figure 4
"Beam" is measured at four points: The gunnel, the widest point of the boat (maximum beam), and the three-and four-inch working waterlines.

Figure 5
The upward curve of the keel line at each end of the canoe is called "rocker."



The Ins and Outs of Towing Your Boat

Trailer Boats Magazine

by Bob Kovacik

Though most boat towing is done with trailer loads of less than 2,000 pounds, not every vehicle can handle even such a relatively light load. And if your boat and trailer weigh more than 2,000 pounds, the requirements can get stringent.

Modern vehicles are different from those offered at the beginning of the 1980s and earlier. For example, very few modern cars have tow ratings of more than 2,000 pounds. Most, in fact, are rated to tow less, if at all. Chances are your only alternative for a load much over 2,000 pounds may be a truck, because of its stronger frame. Also, a so-called "tow rating" may not be the way to judge how much a vehicle can actually tow.

One important consideration to keep in mind is that if you want a large boat, you need a large tow vehicle. If you want a small tow vehicle, get a small boat.

Towed load weight

Let's start by taking a look at your towed load—not the boatbuilder's dry weight or shipping weight of the boat, but the entire towed load, which includes trailer, motor, fuel and whatever accessories and equipment that will be carried in the boat. Too often a buyer will use a boatbuilder's reported weight of the boat alone, without engine or trailer, to determine which tow vehicle to buy. That can be a disastrous decision. For example, if a

boat's weight is 2,000 pounds, adding an engine, trailer, accessories and fuel can easily double the towed weight, which puts the buyer into an entirely different towing category.

The only true way to determine your towed load is to weigh it. It only costs a few dollars to get accurate weights at a public scale, and it can save thousands of dollars in unexpected repairs.

You'll need to know the tongue weight and the weight of the boat and trailer. Tongue weight is the amount of weight the trailer tongue exerts on the hitch ball. Automotive manufacturers generally recommend a tongue weight that is 10 to 15 percent of the total trailered weight. Next, you'll want to know the total towed weight. Be sure the boat and trailer are fully loaded with fuel, passengers, equipment and everything else that will accompany you to the water.

Once you know what your towed load is, it will be your guideline when looking for a tow vehicle . . . but only a guideline.

Most automotive manufacturers offer towing guides, which are available through dealers. A towing guide may be an in-depth booklet or it might be a page or two of towing explanations in an owner's manual. Nonetheless, follow all the recommendations and requirements carefully. There are a lot of disclaimers in towing guides, and if you don't follow them exactly, you can void your warranty.

Limitations

Modern automobiles have severe limitations. Those limitations are caused by construction and powertrain components. Today's cars use unit-body construction for lightness. Unit-body, or unit, construction is a method by which an automobile body and chassis are designed as one compatible unit. That is, it's designed to spread a load from one portion of the unit to all other portions of the unit.

This means that a lighter, more flexible material can be used because no one part of the unit absorbs all the force. In a full-frame chassis, for example, all of the force in one location is absorbed by only one component—the frame—which is a big, heavy hunk of metal. In a full-frame vehicle, the body itself only rests on the frame and is not structurally responsible for road and towing actions.

A unit body is designed to flex, to absorb and distribute forces. It works very well, until you disrupt that flex with something like a hitch or the pulling and pushing forces of a towed load. When that happens, flex is restricted and stress concentrates in one area of the light-metal chassis/body. The result can be cracked or deformed metal, sometimes uncorrectable.

Older-style cars and most trucks have full frames.

Another significant difference is between front-drive (transaxle) and rear-drive vehicles when it comes to towing.

A transaxle is a transmission, differential and driving-axle assembly combined into one unit that drives the front wheels. In automobiles, a transaxle is made of light-duty parts, which is another reason why most front-drive vehicles have tow ratings of 2,000 pounds and less. Also, when you add a tongue weight at the rear of one of these vehicles, it could raise the front driving wheels off the ground enough to cause a lack of traction while towing.

At a launch ramp it's a special problem, because the front driving wheels could be raised high enough so that traction is totally lost. When this happens, you may need a couple of hefty friends to sit on the hood to get better traction.

Tow ratings

Most manufacturers have tow ratings for their vehicles. But those tow ratings can get complicated and confusing for the uninitiated. For example, a maximum tow rating may only be for an unloaded tow vehicle. That is, the maximum tow rating might be for a vehicle with a full fuel tank, oil and water, but not with a driver, passengers or optional equipment, such as air conditioning, radio, etc. It's not unusual to add 500 pounds of options to some tow vehicles, another 500 pounds for passengers and still another 500 pounds for equipment. That can bring the tow rating down by 1,500 pounds.

You'll have to study the towing charts carefully. There are, however, two terms you'll find frequently that have a dramatic effect on how well or how poorly a vehicle will tow. These are "axle ratio" and "Gross Combined Weight Rating" (GCWR).

An axle ratio is the relationship between driveshaft (or transaxle gear) revolutions and driving-wheel revolutions. Usually expressed in a symbol, like 3.0:1. Generally, the higher the axle-ratio number, the better it is for towing.

The Gross Combined Weight Rating is the combined weight of a fully loaded tow vehicle, including passengers and cargo, and the loaded trailer. This figure is mostly used for trucks.

Transmissions

Another important consideration found in towing charts is the transmission—either manual or automatic.

When towing, manual transmissions have limitations, particularly in light-duty vehicles, such as automobiles and smaller trucks. Many tow ratings require that an automatic transmission be used. This is because in lighter vehicles the clutch and drivetrain may not be up to handling a towed load.

If an automatic transmission is used, it is generally required that it be equipped with an external transmission oil cooler, because heat is an automatic's greatest enemy. An external cooler has its own separate radiator to provide extra cooling. This type of cooler is included in manufacturer's towing packages or it can be purchased separately at automotive and recreational vehicle stores.

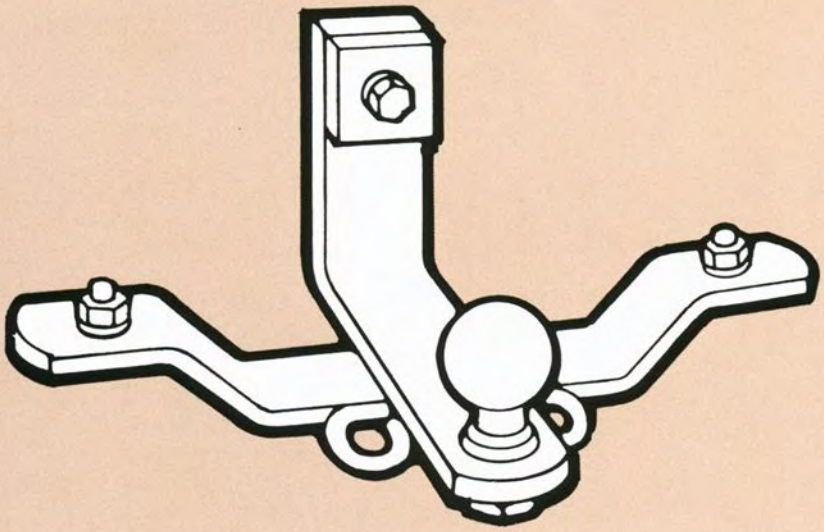
Cooling systems

You may need other cooling systems, as well. If your tow vehicle has air conditioning and the towed load is light, the radiator may be of sufficient size. When factory air conditioners are installed, a larger radiator is part of the package. However, if you'll be doing some hefty towing, a larger radiator is a major asset. Heat is the greatest enemy of an engine, along with dirt from incoming air and unclean air.

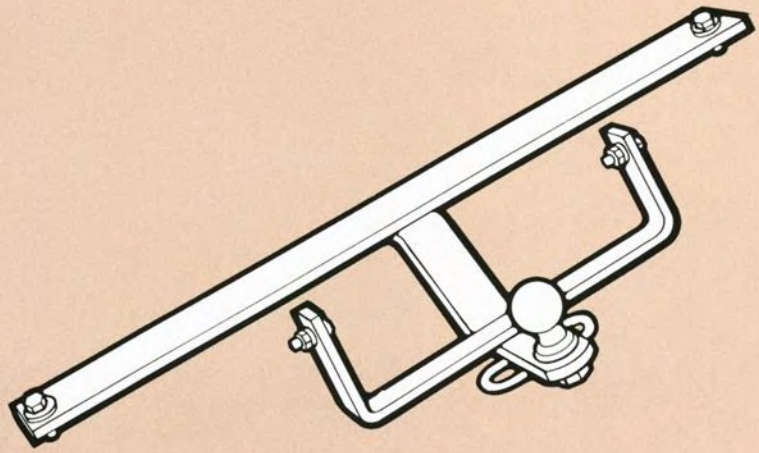
Engine oil coolers have become increasingly important, especially in smaller engines that have less oil capacity. You may not suspect a need for an engine cooler, simply because the temperature gauge may show normal. However, that temperature gauge is for coolant temperature, not for engine oil temperature. Many manufacturers recommend an engine oil cooler when towing.

Suspension systems vary so greatly with different towed loads that there is no specific general rule to follow. Heavy-duty shock absorbers, spring rates, stabilizer or sway bars, larger brakes and bigger wheels are the most common suspension additions in a manufacturer's towing package.

There are a host of accessories you may want or need to buy for your tow vehicle. Before you do any of that, I strongly recommend you check out a factory-installed tow package. Many factory-installed tow packages are quite complete. Hitches may also be included. What makes a factory tow package so palatable is that it will generally cost you less and it's covered under warranty.



Class I (up to 2,000 pounds)
Weight-carrying hitch for light duty, mounts to bumper, sometimes mounts to frame. Tongue weight limit usually 200 pounds.



Class II (up to 3,500 pounds)
Weight-carrying hitch for medium duty, mounts to frame. Has receiver assembly or ball mount. Up to 500 pounds tongue weight. A few have capability for weight distribution.

If a hitch does not come with your tow vehicle, you'll need to choose from four hitch classifications: Class I (under 2,000 pounds), Class II (up to 3,500 pounds), Class III (up to 5,000 pounds) or Class IV (over 5,000 pounds).

In the various tow ratings, you'll often see requirements for certain types of hitches. Most often these requirements will be for either "weight-carrying" or "weight-distributing" hitches. But we'll get into that a little later.

Class I hitches

The smallest hitch is a Class I, intended for loads under 2,000 pounds. It comes in three basic types: a bumper mount, a bumper/frame mount and as part of a step bumper. Another type of bumper hitch is clamped onto the bumper itself and is not recommended for recreational towing.

A bumper-mounted hitch is often not a good idea, especially if it is not connected to a bumper bracket. Most car bumpers are made of a light alloy, while hitches are usually made of steel. Besides not having sufficient strength, modern alloy bumpers can cause a galvanic action between the alloy and the hitch steel, which results in corrosion and eventual failure.

The best Class I bumper hitch is one that also bolts to the frame of the vehicle.

Step-bumper hitches found on trucks are often suspect. Many of these are for decorative purposes only. Even though a step bumper may have a hole drilled into it for hitch ball installation, the bumper itself may not be strong enough to handle a tongue load. Bracing and brackets on many step bumpers are inadequate, causing the bumper to bend or break. If you choose a step bumper, be sure it is properly constructed for towing.

Class II hitches

Class II hitches are frame-mounted, which means that they connect to the frame of the vehicle, not to the bumper. Some vehicles may sometimes need extra bracing to support the hitch. On a unit-body vehicle, for example, the hitch is bolted to sheet metal, rather than a heavy gauge, steel frame. Without extra support, the bolts can pull away from the sheet metal.

Some Class II hitches come with a receiver, which is a square hole into which the hitch ball shank can be inserted. Receiver hitches are used mostly for weight-distributing systems or when the owner

Drawings courtesy of Reese

wants to remove the hitchball for cosmetic reasons.

Class III, IV hitches

Once you get into Class III and IV hitches, you're into the heavy-duty towing category. This is the area in which you will probably need a truck and a frame-mounted receiver hitch. More important is that you'll be getting into very heavy tongue weights that will dramatically affect the way your tow vehicle drives. Although a 500-pound tongue weight may not sound like a lot of weight, that weight is extended behind the tow vehicle and causes a leverage effect that can disrupt handling considerably.

What usually happens is that the tongue weight lifts the front steering wheels of the tow vehicle. This results in sloppy steering, a thumping bounce at the back of the tow vehicle, and sway at the back of the vehicle and at the trailer. Suspension aids may help some, but the most successful counteraction is the use of a weight-distributing hitch.

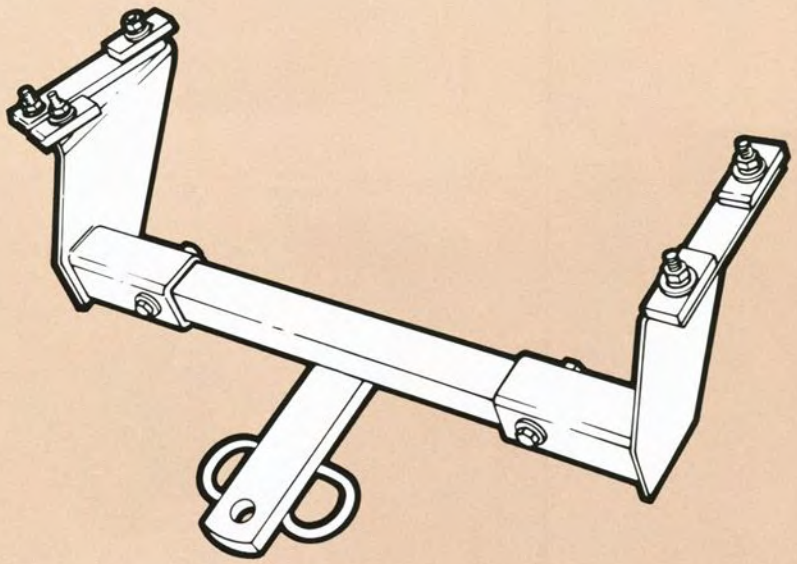
A weight-distributing hitch spreads tongue weight over the front and rear axles of the tow vehicle and the trailer axle(s). With a 500-pound tongue weight, for example, you can redistribute the weight so that 200 pounds is on the front axle, 200 on the rear axle and 100 on the trailer axle(s). The result is a stable, controllable boat/trailer combination.

If a weight-distributing system is used with surge brakes, you may need a pole tongue adapter, surge-brake adapter or both.

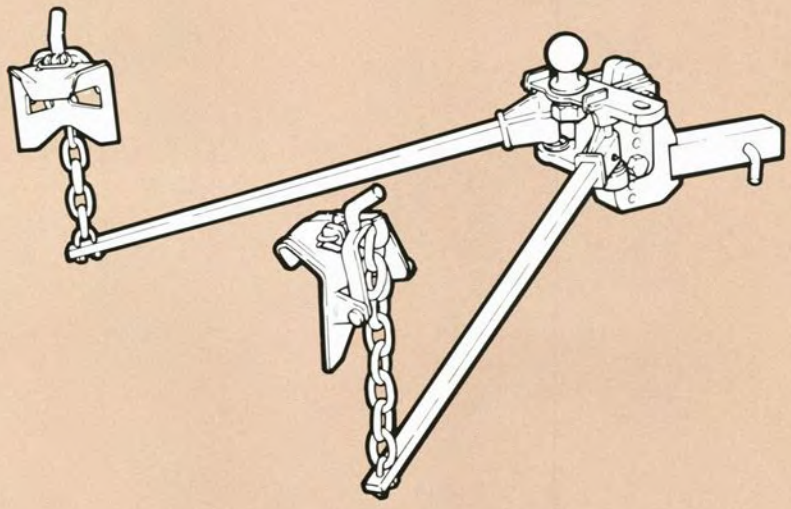
A pole-tongue adapter is necessary when the trailer tongue will not allow the weight-distributing, or spring, bars to be connected. This adapter mounts on the trailer tongue and extends outward on each side to accommodate the brackets needed for spring-bar attachment.

When using an Atwood surge-brake actuator, you can use a weight-distributing system as long as the spring-bar chains are perpendicular. However, for a heavy-duty surge-brake actuator, such as a Dico, the trailer brakes will not operate properly, so a special adapter is required. The adapter is available from Dico, or many hitch installers and trailer manufacturers offer them as accessories on custom-made models.

Selecting and equipping a tow vehicle include much more. Hopefully these few basics will help lead you in the proper direction.



Class III (up to 5,000 pounds)
Weight-carrying hitch for heavy duty use, mounts to frame and has receiver assembly. Many have weight-distributing capability. Up to 75 pounds tongue weight.



Class IV (up to 10,000 pounds)
Weight carrying hitch for extra-heavy duty use. Mounts to frame as do Class III hitches. Up to 1,000 pounds tongue weight. Has receiver assembly and weight distributing capability.

Drawings courtesy of Reese

Pennsylvania

Steamboating

by Richard A. DeBlasio

photo provided by author

Memories of steamboat travel on the three rivers that embrace Pittsburgh, the Allegheny, Monongahela and the Ohio, are steadily fading from Pennsylvania's river history. But the lore of these fascinating vessels tells us how important they were in the development of Pennsylvania's settlements, commerce, communication and daily life along the rivers from the late 1800s until around the 1930s.

Steamboats, or paddlewheel boats as they are also called, provided swift, comfortable and luxurious travel for passengers and a profitable means for distributing manufactured goods westward as far as the Missouri and Mississippi rivers, which join the Ohio. The steamboats providing this dual service for passengers and cargo were called "packets," and ran on a fixed schedule between two places.

Steamboat business around Pittsburgh bustled so much that newspapers hired river-news editors to write news and advertising copy in daily columns. Advertisements announcing departure dates and points of departure generated a profitable business for the owners of the boats because the demand for transporting goods was high.

The size of the steamboats appeared to be too large for the rivers. They were usually three or four decks high and almost half as long as a football field. The first deck of the earlier steamboats housed two coal-generated steam boilers and machinery that turned paddlewheels on the port and starboard sides of the boat. "Sidewheelers," as they were called, provided dexterous maneuverability to the captain or pilot for easy navigation on the pre-dammed and shallow rivers. A captain of one of the boats once said, "I can turn her around on a dime and still have nine cents change."

Transformation

As technology improved, stronger steel boilers were developed that permitted the use of only one boiler. It was capable of producing more steam pressure to power a single paddlewheel attached to the stern of the boat, thus transforming the sidewheeler into a "sternwheeler." Twin smokestacks on both types of steamboats towered so high that they had to be lowered on hinges each time the boats navigated under a bridge.

Steamboats helped Pittsburgh become a booming industrial center during the late 1800s by providing transportation for such factory goods as steel, barbed wire, glassware and barrels of vinegar and pickles from the H. J. Heinz Company. The first deck was built low to the waterline to allow for ease of loading cargo by hand, giving the impression that the boat was always overloaded.

The second deck represented the ultimate in houseboats, even by today's standards. Berths, staterooms and dining facilities were decorated with elaborate mahogany architecture, thick carpets and ornamental mirrors. Not a penny was spared in making these floating hotels the most elegant boats on the rivers. Many even used fine china and crystal personalized with the name of the boat.

Paying passengers

Taking advantage of these luxuries were the paying passengers, which could number up to 60. A round trip ticket from Pittsburgh to Cincinnati, a distance of about 470 river miles, cost $35 including meals and berth. It took about one week at the swift speed of eight miles per hour, depending on the water level. The Pittsburgh-Cincinnati packet ran boats three times per week.

Passengers could also board or depart anywhere along the river between the two cities. All one had to do was stand along the river bank and wave a white handkerchief in the day or a lantern at night. The boat would glide toward shore, blast its whistle and swing the landing stage (gang plank) onto the bank for the passengers to board or depart.

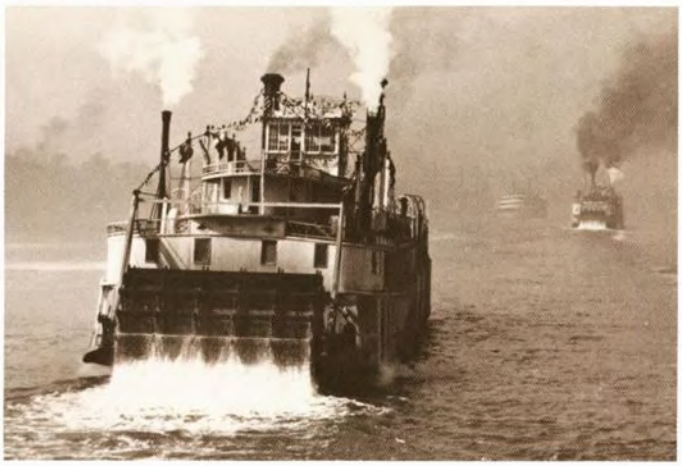
Although passenger travel proved profitable for the packet lines, it was seasonal because people found little desire to travel on the river during the cold-weather months. Passenger service was also provided from Pittsburgh to Oil City, and if the water were high enough, a boat could reach northern Pennsylvania and New York.

Traditionally, the top deck contained a group of rooms that became known as the "Texas" deck, because it was added to the boats at around the same time Texas was admitted to the Union. The Texas deck was combined with the pilot house and housed the captain and pilot. Depending on the size and design of the steamboat, the Texas deck was sometimes modified to accommodate passengers or special facilities.

During the summer months when the boats bulged with passengers, there could be up to a 30-member crew including cooks, waiters and maids. There were never fewer than 10-12 deck hands solely responsible for the boat and cargo. Usually this included two engineers, two firemen and two pilots.

Pay for deckhands, at least in 1925, was one dollar per day including meals. They were on call for duty 24 hours a day and had to sleep between stops in the cargo and boiler areas.

The longest-running steamboat was the *Quenn City,* which navigated the Allegheny, Monongahela and Ohio rivers for 43 years, from 1887 to 1940, when it lost its usefulness as a packet boat. A few packet boats found new life after retirement by serving as restaurants and nightclubs at permanent resting places along the river.



Inspections

Packet steamboats were considered safe. To ensure their safety, inspection teams were designated by the federal government to inspect them annually for standard safety regulation compliance, such as life jackets, fire extinguishers and the general condition of the structure. These inspection teams later became known as the U.S. Coast Guard.

There was only one major steamboat accident on Pennsylvania rivers, in 1903, and ironically the boat was named the *City of Pittsburgh.* In the mishap, the fore section caught fire and passengers began jumping off the stern. As panic increased, some of them fell into the huge paddlewheel as the boat steamed toward shore.

Pittsburgh boat builder

Besides being a major steamboat trade center, Pittsburgh was also a major center for boatbuilding because of vast timber resources and the many machine shops that could provide boilers and metal parts. One such boat builder, James Rees and Sons, built and assembled steel-hulled boats. The boats were assembled, their parts were numbered, and then they were dismantled, put into crates, and shipped to other parts of the world. One of these vessels, built on the Allegheny River, is said to be still carrying passengers on the Nile River, but the boilers have probably been replaced with a diesel engine.

Packet boats played an important part of Pennsylvania's river history until they had to stop and let the trains pass by. Today, colorful replicas from this special era still navigate Pittsburgh's three rivers, but most operate as hour, six-hour or day-long pleasure outings. The memories of the way steamboats really were are few.

Steamboat Facts

Horsepower didn't make the steamboats great. Pounds per square inch (psi) of steam-generated power did. Sidewheelers' boilers each produced 80-100 psi and a single sternwheeler's boiler produced about 244 psi.

Names of steamships never began with the letter "M" because "M" is the thirteenth letter of the alphabet. Riverboat captains respected this superstition. Strangely, a boat named *Marianne* did have an unfortunate calamity.

photos provided by author

KIDS PAGE!

Boating Laws

Winter is a good time to study your boating laws. Both the state of Pennsylvania and the federal government have boating rules and regulations. These laws are made for your safety and for the safety of others.

These laws are enforced by the waterways conservation officers. Any time a police car or boat flashes its lights and motions you over, you must obey! The officers will also check your boat to make sure you have all the required safety equipment on board.

Test your knowledge of the boating laws by "cracking" the code below.

1. On state waters, children under __ __ __ __
   13 18 13 22
   years of age and non-swimmers must wear personal flotation devices (PFDs).
2. __ __ __ __ __ people are needed to water ski.
   7 19 9 22 22
3. It is illegal to operate a __ __ __ __ while under
   25 12 26 7
   the influence of alcohol and/or drugs.
4. A person operating a sailboard must wear a personal __ __ __ __ __ __ __ __ __ device.
   21 15 12 7 26 7 18 12 13
5. It is illegal to __ __ __ __ __ __ Pennsylvania's
   15 18 7 7 22 9
   land and water.
6. Water skiing is prohibited during the hours of sunset and __ __ __ __ __ __ __ .
   9 6 13 9 18 9 22
7. It is illegal to operate a boat in a no-boat area, such as a swimming
   __ __ __ __ __ .
   25 22 26 24 19

To reveal answer to kids page hold this section facing a mirror.

Safety Code

a	b	c	d	e	f	g	h	i	j	k	l	m	
26	25	24	23	22	21	20	19	18	17	16	15	14	
n	o	p	q	r	s	t	u	v	w	x	y	z	
13	12	11	10	9	8	7	6	5	4	3	2	1	

Answers
1. Nine
2. Three
3. Boat
4. Flotation
5. Litter
6. Sunrise
7. Beach

Boating Safety Message:
BOAT WITH A FRIEND

Boating Safety Message

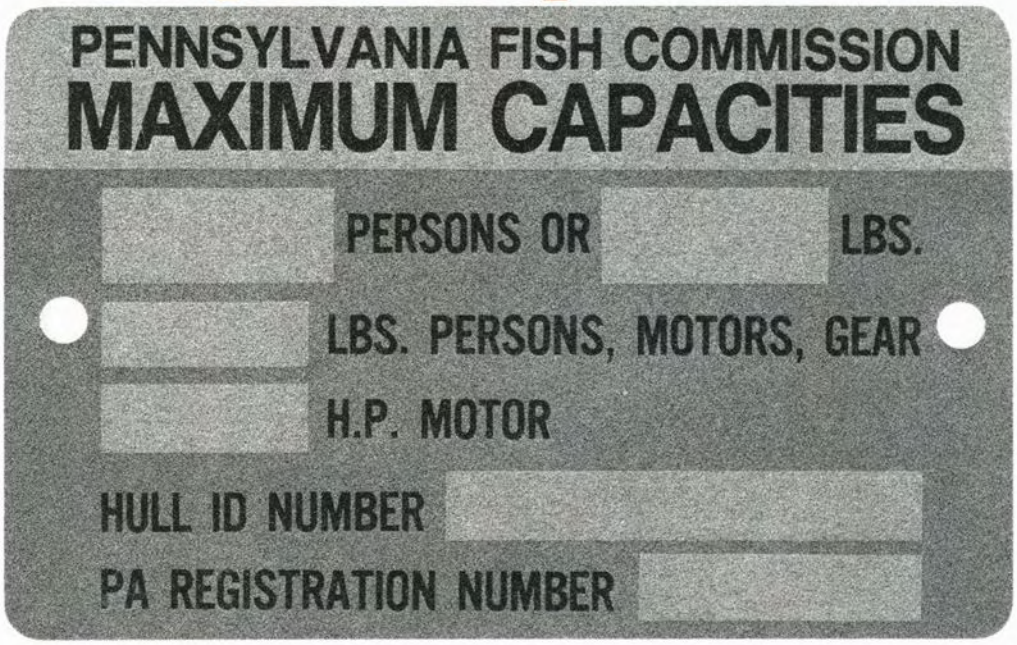
__ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __
25 12 26 7 4 18 7 19 26 21 9 18 22 13 23

Cold-Weather Warning

Every year unprepared boaters suffer serious injury because of hypothermia. Hypothermia is the loss of body heat caused by exposure to the cold. Cold weather can be a time of pleasurable boating, but remember to dress properly with several light layers and a windbreaker outer layer. This is better than one bulky single layer of clothing. Remember also to have rain gear available, and always wear your PFD on the water.

graphics by Rose Boogli

Pennsylvania's Capacity Plate



by Fred Menke

Each watercraft can safely support a specific amount of weight. When a load exceeds a boat's safe capacity, the craft will become unstable, handle poorly and will endanger its passengers. Observe and understand your boat's capacity plate restrictions. It's the law, and heeding your boat's capacity contributes greatly to your safety.

Boats requiring capacity plates

Capacity plates are required to be permanently affixed to every monohull boat less than 20 feet in length designed to carry two or more persons and to be propelled by machinery or oars as its principal source of power if the boat is manufactured, transferred, or offered for sale in Pennsylvania or the boat is operated on any waters of this Commonwealth after January 1, 1990.

Boats exempt from capacity plates

Canoes, sailboats, kayaks, inflatables, hydroplanes and boats considered by the Commission to be of unusual or unique designs, such as "sneak" boats and "thrill" craft, are exempt from requiring a capacity plate.

Information required on capacity plate

A capacity plate must bear the following information permanently marked to be clearly visible and legible from the position designed or normally intended to be occupied by the operator of the boat when under way:

- The recommended number of persons commensurate with weight capacity of the boat and the presumed weight in pounds of each person. In no instance is such presumed weight per person to be less than 150 pounds.
- The total weight of persons, gear and other articles placed aboard, which the vessel is capable of carrying with safety under normal conditions.
- The maximum horsepower the vessel is capable of carrying safely under normal conditions.
- Hull Identification Number (if known).
- PA registration number (assigned by the Fish Commission Boat Registration Division when the boat is registered).

How to acquire a capacity plate

Any boat to which a capacity plate is required under the law must make application to the Fish Commission on Form PFC-702. The application has to be accompanied by a fee of $2.

How weight/hp on the capacity plate is calculated

On receipt of the completed application Form PFC-702, the information below is fed into a computer programmed to determine capacity in accordance with U.S. Coast Guard standards, including type of hull, type of steering, overall length, maximum beam, stern width and transom height.

Hull Identification Numbers.

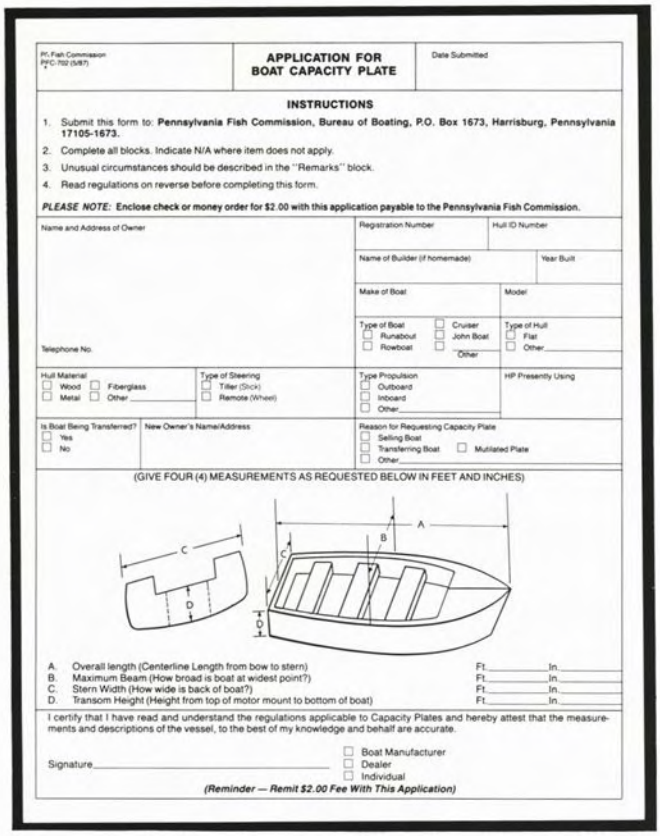
These numbers consist of 12 alpha/numerical characters issued by the manufacturer or by the state in the case of a homemade boat. The entire 12-digit number must be affixed to the outboard side of the transom (burned, carved, engraved, etc.) so that any attempt at removal or alteration would be immediately obvious.

Capacity plate as a warrant

The information appearing on a capacity plate is deemed to warrant that the person affixing the capacity plate has correctly and faithfully used an approved method and formula for the calculation of maximum weight capacity and that the information appearing on the capacity plate with respect to maximum weight capacity and recommended number of persons is the result of the application of such method and formula, and with respect to information concerning horsepower limitations that such information is not a deliberate or negligent misrepresentation.

Location of capacity plate

The capacity plate must be located at a position handy for observation from the position of the operator. This could be on a dashboard, high on the gunwale next to the position of the operator, or on the transom for a boat operated from this point.



Pa. Fish Commission
PFC-702 (5/87)

APPLICATION FOR BOAT CAPACITY PLATE

Date Submitted

INSTRUCTIONS

1. Submit this form to: **Pennsylvania Fish Commission, Bureau of Boating, P.O. Box 1673, Harrisburg, Pennsylvania 17105-1673.**
2. Complete all blocks. Indicate N/A where item does not apply.
3. Unusual circumstances should be described in the "Remarks" block.
4. Read regulations on reverse before completing this form.

PLEASE NOTE: **Enclose check or money order for $2.00 with this application payable to the Pennsylvania Fish Commission.**

Name and Address of Owner

Telephone No.

Registration Number | Hull ID Number

Name of Builder (if homemade) | Year Built

Make of Boat | Model

Type of Boat: ☐ Runabout ☐ Rowboat ☐ Cruiser ☐ John Boat ☐ Other

Type of Hull: ☐ Flat ☐ Other

Hull Material: ☐ Wood ☐ Fiberglass ☐ Metal ☐ Other

Type of Steering: ☐ Tiller (Stick) ☐ Remote (Wheel)

Type Propulsion: ☐ Outboard ☐ Inboard ☐ Other

HP Presently Using

Is Boat Being Transferred? ☐ Yes ☐ No

New Owner's Name/Address

Reason for Requesting Capacity Plate: ☐ Selling Boat ☐ Transferring Boat ☐ Mutilated Plate ☐ Other

(GIVE FOUR (4) MEASUREMENTS AS REQUESTED BELOW IN FEET AND INCHES)

A. Overall length (Centerline Length from bow to stern) Ft.___ In.___
B. Maximum Beam (How broad is boat at widest point?) Ft.___ In.___
C. Stern Width (How wide is back of boat?) Ft.___ In.___
D. Transom Height (Height from top of motor mount to bottom of boat) Ft.___ In.___

I certify that I have read and understand the regulations applicable to Capacity Plates and hereby attest that the measurements and descriptions of the vessel, to the best of my knowledge and behalf are accurate.

Signature_____ ☐ Boat Manufacturer ☐ Dealer ☐ Individual

(Reminder — Remit $2.00 Fee With This Application)

A capacity plate must be put on every boat less than 20 feet long designed to carry two or more people and designed to be propelled by machinery or oars as its principal source of power if the boat is manufactured, transferred or offered for sale in Pennsylvania or if the boat is operated on any waters of the Commonwealth after January 1, 1990.

Art Michaels

Prohibited acts

- It is unlawful for anyone to tamper with or remove a capacity plate or any of the information shown.
- It is unlawful for anyone to sell or otherwise transfer ownership of a boat subject to the law.
- It is unlawful for any person to furnish a false or fraudulent statement on an application for a capacity plate.
- It is unlawful to operate a boat on which the capacity plate is not legible. Owners of such boats shall make application for a replacement plate by submitting Form PFC-702.
- It is unlawful to operate a boat for which a capacity plate is required unless the boat displays the capacity plate.

Fred Menke is the Comission Bureau of Boating aids-to-navigation coordinator.

REMARKS

REGULATIONS APPLICABLE TO CAPACITY PLATES

1. Capacity plates are required to be permanently affixed to every monohull boat less than 20 feet in length designed to carry two or more persons and to be propelled by machinery or oars as its principal source of power if the boat is manufactured, transferred, sold or offered for sale in Pennsylvania; or the boat is operated on any waters of this Commonwealth after January 1, 1990.
2. Canoes, sailboats, kayaks, inflatables, hydroplanes, and boats considered by the PA Fish Commission to be of unusual or unique design, such as "sneak" boats and "thrill" craft, shall be exempt.
3. Any boat not having a capacity plate affixed thereto by the manufacturer thereof may have such affixed by any other person. The plate so affixed must be obtained from the Commission by making application on Form PFC-702 for such plate. **The application shall be accompanied by a fee of $2.00.**
4. The capacity plate shall be located at a position handy for observation from the position of the operator. This could be on a dashboard, high on the gunwale next to the position of the operator, or on the transom for a boat operated from this point. If it is impracticable or undesirable to affix such plate, the manufacturer, or other person having the responsibility for affixing the plate, may represent such impracticability or undesirability to the Commission in writing.
5. **Prohibited acts** - It is unlawful for anyone to tamper with or remove a capacity plate or any of the information shown thereon, furnish a false or fraudulent statement on the application, operate a boat on which the capacity plate is not legible or operate a boat without the required capacity plate.
6. The horsepower and weight carrying capacities indicated on a capacity plate are RECOMMENDED MAXIMUMS applicable to normal conditions. Capacity plates are issued for a boat considered to be in sound and seaworthy condition. It is the owner's responsibility to insure that his boat is of sound construction so as to protect the safety of its occupants.

1988 Outstanding Safety Instructors

In 1988, four awards were given by the Fish Commission Bureau of Boating to outstanding instructors in the Commission Boating and Water Safety Awareness Program.

The *Outstanding Youth Group/Instructor Award* went to Kevin Kriner of Emporium in Cameron County. Kevin is an instructor for the Boy Scouts and is a volunteer for the Fish Commission. Kevin has taught over 14 youth group programs during the past two years, mainly through scout groups and state parks. He is an instructor-trainer for the Boating and Water Safety Awareness Program and is also a water rescue instructor. Kevin is an avid spokesman for boating and water safety and often involves his family with the courses.

The *Outstanding School Teacher Award* was presented to Anthony Schock of Schuylkill Valley Intermediate School. Tony has been teaching the program at his school for three years. He recruits local boating safety groups such as the U.S. Army Corps of Engineers, U.S. Coast Guard Auxiliary and YMCA to assist with his on-the-water program at Blue Marsh Lake. He is an enthusiastic paddler and also assists the Army Corps of Engineers at Blue Marsh with canoeing demonstrations at its special events.

The *Outstanding School Award* was won by the Trinity School District. Trinity School has been actively teaching the Boating and Water Safety Awareness Program for three years. Margaret Farabee, Roland Parry and Timothy Sloane are the primary instructors, but five other teachers are also certified and ready to assist. This school district also helps present a Boating and Water Safety Program at the Washington County Conservation School each year. These instructors have one of the best programs in the area.

The *Outstanding Organization Award* went to Bear Creek Camp in Luzerne County. This camp serves Lutheran churches in Eastern Pennsylvania. Kevin Kring, camp naturalist, has included the Boating and Water Safety Awareness Program in his camp curriculum for the past three years. This program is taught several times each summer by his camp staff.

Water Rescue Training Workshop

A Water Rescue Training Workshop sponsored by Harrisburg River Rescue in cooperation with the Fish Commission Bureau of Boating will be held March 31 to April 2, 1989. The workshop will be the Pennsylvania Phase I program (Basic Rescue Preparedness). Emphasis is placed on planning and training, focusing on rescuers' safety. For more information, call the Commission Bureau of Boating at 717-657-4540.

Ice Rescue Conferences

The Fish Commission Bureau of Boating is co-sponsoring three statewide ice rescue conferences in DuBois, Harrisburg and Pittsburgh. The "Ice Safety and Rescue" program was developed primarily for training fire and rescue personnel, although it has been adapted to train police, park service personnel and other water safety organizations. The focal points of these conferences include ice strength, equipment, ice rescue techniques and medical considerations. For more information, call the Bureau of Boating at 717-657-4540.

Paddling Publication

Welcome Paddler! is the title of a United States Canoe Association (USCA) pamphlet that provides an introduction to sound canoeing practices. Subjects include dangers to avoid, upsets, loading your canoe, wind and waves, instruction, racing, controlling the canoe and other topics.

To receive this pamphlet, contact: USCA, P.O. Box 5743, Lafayette, IN 47903.

Commission Meetings

At its October 1988 meeting, the Fish Commission established its 1989 tentative meeting schedule. The Commission will meet April 24 in the State College area, July 17 in the Harrisburg area, and October 23 again in the State College area. All these 1989 dates are Mondays. The details on each meeting's time and place are usually set about a month before each meeting. Call the Commission at 717-657-4522 for this information.

Boating, Water Safety Awareness Instructor's Course

The Fish Commission will teach an instructor's workshop at Slippery Rock University on April 8 and 9, 1989. This course is open to school teachers, park personnel and youth group leaders interested in teaching boating safety in their schools or areas. Topics to be covered include personal flotation devices, boating accidents, small-boat safety, hypothermia and other safe boating tips. The course will include classroom and pool sessions.

For more information, contact Cheryl Kimerline, Bureau of Boating, P.O. Box 1673, Harrisburg, PA 17105-1673.

Hobie Class Association 1989 Race Schedule

Competition for six national championships and one world title have been officially sanctioned by the World Hobie Class Association for 1989, and the Hobie 18 U.S. National Championship from August 20 to 26, 1989, will take place at Presque Isle Bay, Erie.

Participants for this regatta will be drawn from more than 500 Hobie Cat fleets in 16 geographical divisions, location throughout the United States and around the world.

The locations of other championship regattas include San Felipe, Mexico; Tampa Bay, Florida; Monterey, California; Oklahoma City, Oklahoma; and Chicago, Illinois.

Small Craft, Water Safety Programs

The 42nd annual Health and Safety Training Academy (HASTA) sponsored by the Harrisburg area Chapter of the American Red Cross will be held Memorial Day weekend, May 25–28, 1989, on the campus of Gettysburg College. Training opportunities include fundamental courses in canoeing, kayaking and sailing. Instructor classes include CPR, first aid, small craft and water safety. All courses will be taught by American Red Cross certified volunteers. For additional information and/or registration, call the Harrisburg area chapter at 717-257-1807 after February 1, 1989.

Boater's Source Directory

Nearly everything a boat owner may want to know about obtaining information, particularly on boating safety, is contained in *Boater's Source Directory,* just completed and now distributed by the BOAT/U.S. Foundation.

The 29-page pocket-sized booklet lists names, addresses, telephone numbers and descriptions of services and publications available from more than 100 sources throughout the U.S. and Canada, most of which may be obtained free of charge.

The fact-filled directory contains a wealth of information on such subjects as where to register a boat, where to report a boating accident, how to contact the Coast Guard, get weather information or obtain a free courtesy marine examination of your boat, as well as who to call to locate a nearby boating course or report a defect in your boat. The publication also includes handy charts on Coast Guard equipment requirements and the causes of most boating accidents.

Boater's Source Directory was written, designed and produced by the BOAT/U.S. Foundation for Boating Safety and funded by a grant from the U.S. Coast Guard. Grant funds are derived from federal marine fuel taxes paid by boaters and deposited into the Aquatic Resources Trust Fund established by Congress in 1984.

For a free copy of *Boater's Source Directory,* write to: "The Source," BOAT/U.S. Foundation, 880 S. Pickett Street, Alexandria, VA 22304.

Your Boat Must Have a Capacity Plate

By January 1, 1990, every monohull boat less than 20 feet in length must display a capacity plate when operating on Commonwealth waterways. Canoes, sailboats, kayaks, inflatables and boats of unusual or unique design are exempt.

Applications for capacity plates can be obtained by writing to: Pennsylvania Fish Commission, Bureau of Boating, P.O. Box 1673, Harrisburg, PA 17105-1673.

For more details on capacity plates, and how they apply to Pennsylvania boaters, please turn back to page 20 in this issue.

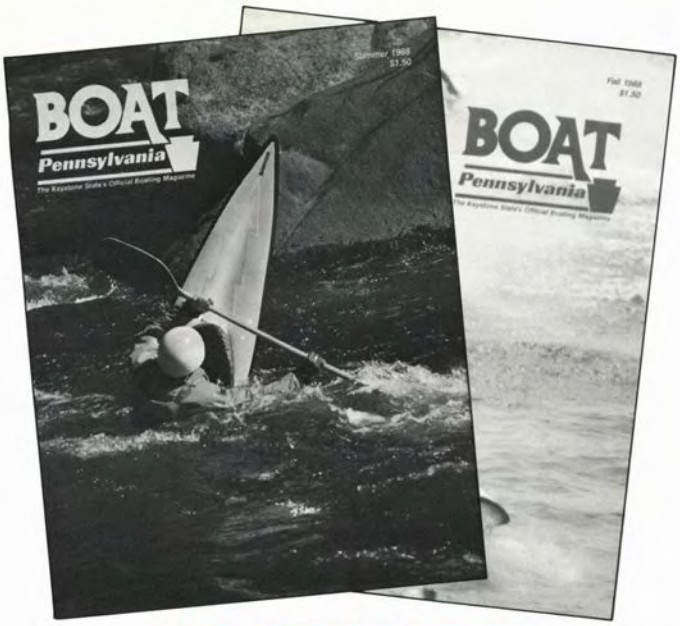
Legislation Affects Boaters

Signed into federal law recently was landmark legislation containing two major provisions that will benefit Pennsylvania boaters. The law provides $2.1 billion to operate the Coast Guard during fiscal year 1989, up from $1.9 billion in fiscal year 1988. In addition to reversing the backward slide in Coast Guard funding, the Coast Guard Authorization Act (Public Law 100-448) should also put to rest one of the thorniest issues affecting boat owners in recent years—namely, how the Coast Guard should use its 30,000-person volunteer auxiliary force in providing assistance to boaters in distress.

The new law directs the Coast Guard to make "full use" of the Coast Guard Auxiliary in rendering aid in non-emergency cases. This overturns an administration interpretation of a 1982 law under which the Auxiliary, as well as the Coast Guard, were precluded from helping boaters in non-emergency cases. For the past few years, the administration has directed the Coast Guard to turn such cases over to commercial towers even though trained volunteers were nearby and ready, willing and able to provide assistance.

Another major feature of the new law is a five-year reauthorization of the Aquatic Resources (Wallop/Breaux) Trust Fund, the centerpiece of the nation's boating safety effort.

This fund collects nearly $200 million per year in marine fuel and fishing tackle taxes paid by boat owners and sportfishermen and returns these monies to the states for boating safety, education, law enforcement and fish conservation programs. The U.S. Coast Guard also shares in this program and will receive $30 million per year from boating's trust fund to administer the Coast Guard Auxiliary as well as coordinate the nation's boating safety effort.



BOAT Pennsylvania

Subject Index

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Why Use a Drysuit?

by John M. Cornish II

When you see them heading for the waterways, they look like they're out of a scene from a James Bond film or posing as astronauts. Actually, sports enthusiasts are donning one of the newest fashions for whitewater paddling and cold-weather water skiing. This new apparel is called a drysuit.

A drysuit is just what its name implies—a suit that keeps the wearer dry. Remember how James Bond could swim a mile or hang glide into a fortress, strip away his wetsuit or coveralls only to be ready for a formal dinner in his tuxedo without a spot or wrinkle? This is now a reality for rafters and skiers with the use of a drysuit. They have not reached the level of perfection that was so evident in the magic of the James Bond movie, but they do provide skiers and river runners with protection against the elements. This protection is needed when braving the cold waters of Pennsylvania streams and rivers in rafts and kayaks as well as the water skiers who want to extend their season. Not many tuxedos are worn under these suits; jeans and a sweatshirt are considered appropriate attire.

Dry suits protect paddlers from the elements, and they let water skiers extend the season.

Many drysuit wearers don sweat pants and a sweatshirt under their suits. Any long-sleeved shirt and pants are suitable, and necessary to act as insulation from the chilling water. For extremely cold temperatures, a specially designed undergarment is available to offer maximum insulation and warmth.

The author (above) shows the James Bond-like use of a drysuit. It keeps him warm and dry on the inside. Notice that he's wearing an approved PFD under the drysuit. Drysuit prices range from about $175 to around $400.

Consider what a drysuit looks like and its construction. One type of drysuit is constructed of a waterproof nylon material. The suit resembles a large pair of shiny, slick coveralls or an astronaut suit. The suits must be oversized because the nylon material with its urethane backing offers no stretch factor. The oversizing allows the wearer to have the necessary mobility without restriction.

Aside from the nylon material in the body of the suit, the neck, the wrists and the ankles of the suit have seals made of latex rubber. These seals are tapered to fit snugly around the body parts to keep the water out of the suit. Some suits have a secondary covering

John M. Cornish II

International barefoot water ski champion Mike Seipel (above) models a drysuit. Drysuits are often made of waterproof nylon with tight latex rubber seals around the neck, wrists and ankles. Proper storage of a drysuit and entering and existing the suit carefully extend its life.

Mary Seipel

of neoprene or navylon with velcro closures to ensure the most watertight seal. The extra closures are fitted on suits designed for more active wearers, such as barefoot water skiers where this extra assistance is necessary.

Rear entry into such suits through a large, heavy duty waterproof zipper is typical. All the suit seams are sewn by special machines that lock the three or four stitches before the gluing or sealing process. Different manufacturers may use varying processes in the construction of their suits for the number of stitches and the gluing process.

Another material that has recently been introduced for manufacturing drysuits is a neoprene rubber similar to that used in the production of wetsuits. These suits resemble the skindiving drysuits that have been used for many years. This garment is also made as a one-piece suit as well as a two-piece suit with the same seals and zipper. The two-piece suit has a special waist band to keep it watertight.

Common problems

In either of these suit types, the most common problems are "blown-out" seals and seam leaks. Both problems are easily repaired if you have a suit that is manufactured by a reputable company. Repair kits are also available for do-it-yourself repairs.

Seals deteriorate after a few years or may tear from stress or abuse. Seams may develop a leak and need some sealant applied. Some companies offer a warranty on their suits for certain types of damage.

For clarification, a wetsuit is a neoprene rubber suit that allows water to enter. The entering water is heated by the body, offering warmth and protection, unlike the drysuit that remains dry.

There are several precautions that may be taken to protect the seals from premature deterioration or tears from

abuse. Take care as you put on or take off the suit. You should use your hands to open the seals and ease them over your head, feet and hands. Pulling and forcing the seals place undue stress on the material that may result in a rip or tear.

Be careful not to use the tips of the fingers or fingernails to stretch the seal open so you don't puncture the latex rubber. Try to use the flat surface of two or three fingers held together to open the seal for entry or exiting the suit. Some manufacturers recommend that you dust the seals with talcum powder to extend the life of the rubber. In addition, never expose your suit to direct sunlight or extreme temperatures.

Proper storage of a drysuit also helps it last longer and resist tears. Suits should not be folded or placed in a drawer or compartment. They should be hung on a wooden or plastic hanger that has broad, smooth ends. The area where they are hung should be dry with adequate air circulation to prevent mold and mildew.

Flat seals

The seals provide an airtight as well as a watertight fit if the wearer takes steps to secure the proper fit. Each seal should be flattened out on the smooth part of the ankles and wrists, free from rolls. The edge of every seal should be pulled up the leg or arm far enough to clear the wrist and ankle bones so that the entire width of the seal lies flat around the limb. The ankle seal needs to be placed high on the leg, above the dips and bumps created by the Achilles tendon into the shin area. Every gap or open space may allow water to enter the suit.

The neck seal also has some special features to consider. It is important to clear all the hair out of the neck seal. Hair serves as a wick for water to enter the drysuit. The neck seal may not fit as nicely as the wrist or ankle seals. The short area of the neck along with the contours of muscles and anatomical parts post problems for a perfect fit. Leaks are not as much of a factor on the neck seal because that seal primarily is above the water's surface. Some suits are made with an extra, special neck seal for the more active individual who may experience neck leaks.

A drysuit also holds a certain amount of air that assists in eliminating neck leaks. The air, which escapes from openings in the neck seal as it goes under the water, pushes the water back, keeping it from entering the suit.

Buoyancy

A drysuit with its tight-fitting seals creates a human balloon. The suit full of air offers an amusing sight while it does serve a purpose. Besides helping to keep water from entering the suit, the air acts as an insulator from the cold.

Air in a drysuit also provides some buoyancy. Too much air may hinder movement both in and out of the water. "Burping" the suit removes the excess air. Burping a drysuit is done by opening the neck seal a bit and squatting or bending over. The air rushes out of the suit, sometimes with a sound, hence the term "burping a drysuit." This process leaves the suit fitting more correctly and comfortably.

Even though the drysuit provides some buoyancy with the trapped air inside it, I recommend that you wear a personal flotation device. A Pennsylvania water skier must wear a U.S. Coast Guard approved PFD as stated in the boating regulations. Barefoot water skiers wear their flotation wetsuits under their drysuits to be safe and meet the requirements of the regulations.

Aside from the need to wear a PFD as outlined in the regulation, it is a safe practice to wear a PFD. If a drysuit should become torn or develop a rapid leak, the individual in the suit may find himself unable to swim, float or maneuver as the suit fills with water. You might compare this situation to a fisherman in a stream with his wading boots filled with water. Wear a PFD!

Price

Drysuits range in price from $175 to over $400. As in any other equipment you purchase, you must evaluate the type of use your suit will receive. The more expensive, heavy-duty suit may be what you need. A durable suit can be purchased for about $250. Other factors to consider in purchasing a drysuit are where the suit is manufactured and by which company. Questions that you should ask are: Can the seals be replaced? How long will it take and what is the cost? Is the suit or any of its parts warranteed?

Why should these questions be asked? Seals may need replacing about every four years. This is due to the loss of elasticity and life of the latex rubber. The better companies usually replace all the seals for $25 to $30 plus shipping charges. Some companies have a three-year warranty on the suit, not including the seals but covering all other leaks and problems. The seals are the most critical and flawed part of the suit.

Some manufacturers are based in Europe. They are very good companies but shipping takes several months. Postage may cost more than the actual repair. Some companies buy a limited quantity of suits for retail or mail order sales and do not have any means of repair or replacement of faulty merchandise. For these reasons, choose a reputable company that is well-known and established.

You may not be James Bond or even a space explorer, but you may be looking to extend your season or just try to stay warmer and drier. The drysuit is the answer for you.

Never too Late to

by Paul Jenkins

My reintroduction to the sport of iceboating, which had given me so many happy hours as a teen, happened almost by accident. About a year ago, while watching a gang of iceboats sailing near the Erie Yacht Club, I bumped in to an old hardwater sailing pal named Pat Doyle. We swapped old iceboating stories as we stood watching the speedy boats dart back and forth.

"Yes, Pat," I said, "We didn't have cars when we were kids but we did have some fun sailing our homemade iceboats. My son Patrick is almost 12 now and I think I'll build him an iceboat."

"No! Don't do that," he said, with a stern look on his face.

Knowing how Pat loved the sport and that he had built several boats for his kids, his reaction surprised me.

"Gee, Pat," I said, "I'll be sure to teach my son to sail safely and build him a good boat."

"I'm telling you—don't build the kid a boat," Pat said. Now he was smiling broadly. "I'm going to give you one!"

He went on to explain that he had an old two-man D.N.-type iceboat in his garage that hadn't been used for years. It was dusty and rusty but could be cleaned up to make a perfect boat for a dad and his son. Even though it was almost March and the ice would soon be gone, I made arrangements to pick up the boat the following weekend.

Garage oddity

The boat was bright orange and deco-

Paul Jenkins

Sharpen Your Blades

rated with a heavy black racing stripe. The homemade craft was crudely built but strong. It needed a new mast. The old one was splintered somehow when the boat was last sailed.

The strange-looking wooden bug made quite a conversation-piece in our garage all the next spring and summer.

"Hey, what is that thing? Is it a sailing dunebuggie?" asked a curious neighbor.

"If there's no ice, we can fit it with pontoons," said the mailman.

As I worked on the boat, I couldn't help but remember the first iceboat I built in my parents' basement. I enjoyed reliving the fun of creating my own special craft.

"Where's dad?" son Patrick would ask when he arrived home from school.

"Oh, he's out in the garage working on your iceboat," his mother would reply.

"Mom, is that really *my* boat?" Patrick would ask. "It's dad who's having all the fun!"

"I know. Fathers do that. It's called reliving their childhood."

"Hey dad, why do they call this crutch-looking gizmo a tiller?"

"Dad? Are you sure this thing will really sail like a real sailboat?"

"Won't those rudders cut right through the ice?"

How could my wife say I didn't share the boat with my son? I answered every question he asked.

Finally, fall came, and with it a new aluminum mast for the boat.

With the first flakes of snow came a gleaming blue paint job. I was hoping for

an early freeze.

One day I stopped by the yacht club and was surprised to see a thin layer of bay ice edged by several anxious iceboaters assembling their boats. I quizzed them about their craft and how soon they expected to sail them.

"Oh heck," said one guy as he worked on a sleek, red Arrow-class boat, "we have about 2 or 3 inches already. We should have plenty of ice by next weekend. All you really need is about four or five inches."

Right.

I recalled an incident that occurred during one long-gone January—what was it, maybe 15 years ago? My cousin was sailing my boat on 10 to 12 inches of ice when he hit an area of open water and flipped the boat. Fortunately, he didn't land in the water and wasn't hurt, but the experience was one we never forgot.

Four or five inches of ice may seem safe to some young iceboaters, but this old boy would still wait a few more weeks.

The "DN" on iceboat sails refers to their origin—a 1937 contest in the Detroit News, *in which readers submitted simple, inexpensive designs that people could build at home.*

Paul Jenkins

Shakedown cruise

The next two weeks went by very slowly, but the weather remained cold with little snow. Finally, the day came for taking the boat to the bay and setting it up.

I decided maybe it would be a good idea to make a few shakedown cruises myself before taking Patrick out.

When I got to the yacht club late that afternoon I was happy to see a thick, slick layer of glistening ice covering the entire bay. A lone iceboater was raising the sail of an Arrow. He yelled out for me to watch my step on the ice near the shoreline and use the footpath marked by an old plank.

After carefully making my way from good wood to good ice, my old eyes finally recognized the boater as Chris Wolford. An experienced iceboater I had met the previous year, he was dressed to kill—or be killed—in a heavy one-piece snowmobile suit, a motorcycle crash helmet and felt-lined boots. He also wore a bright-yellow life jacket. No matter what happened to his body, I knew it wouldn't sink.

Dangling from Wolford's pants pockets were short loops of heavy twine. When I asked about the twine he pulled a loop from one pocket. It was attached to a five-inch long tape-wrapped carpenter's spike.

"This is my extra insurance," he said, "If I fall through the ice I can use it to claw my way out. That's also why I wear a one-piece insulated suit. It helps hold body heat and slows down the effects of hypothermia if you have to swim for it."

So. No matter what happened to his body, it would float *and* stay warm. For a while.

I hated to ask the inevitable question: "How thick is the ice?"

"Oh heck. We have plenty of ice," said Wolford. "Just make sure you watch out for the bad spots. If you sail down by the condos (he pointed toward a highrise building about a mile from the yacht club), watch out for the big brown spot. I sailed into it yesterday and when I got out to push, I sunk in to my knees."

Wolford also warned of a three-foot high pressure ridge just north of the yacht club channel. A pressure ridge is caused by the up-and-down movement of the water under the ice. The ridges are made of large, flat chunks of ice that look like broken slabs of concrete. These ridges spell D-I-S-A-S-T-E-R when hit by a speeding iceboat.

The smooth ice under my feet was clear and hard. It stretched to the far shore like an inverted cobalt-blue sky. Here and there scattered patches of pure white snow clung like windblown clouds.

The wind was out of the west at about 15 miles per hour and the temperature was around 30. Sailing conditions were almost perfect. After hearing about all the bad ice, however, I wondered if it might be better just to set up my boat and wait another week.

Soon several other sailors arrived and went flying across the bay as soon as their sails were up. When my own white dacron main was finally hoisted and the sheet line was threaded through the stainless steel blocks, my heart raced with excitement.

This was the moment I had been looking forward to for over a year.

Why not take a little ride? After all, every boat must have a shakedown cruise.

I figured the ice must be okay. The other boats weren't having trouble. I reached over and barely nudged the boat and it slid like a bar of soap on a shower floor.

There it sat, perched up on silver runners like a water spider, waiting to grow wings and fly.

I couldn't stand it any longer. One quick push, a turn of the tiller, and I was sailing.

Dragster

My heart raced as I pulled in the sheetline and felt the steady pull forward. The boat slid along quickly and quietly with only the slicing sound of the runners occasionally swishing through a patch of brilliant snow. The feeling of the boat un-

Iceboat prices range from about $1,000 to around $2,500. Prices for used boats range from about $1,000 to $1,500.

der me and the quick response of the wishbone tiller brought back old feelings. As we left the shore behind, our speed picked up. The boat and I were one.

Sort of.

From out of nowhere a strong puff hit the sail and the boat accelerated like a dragster. The boat and I were two again. The peaceful easy ride turned suddenly into a teeth-rattling, white-knuckle experience that was both exciting and frightful. I couldn't help but wonder if this 46-year-old man should be back in this young man's sport.

As I headed out across the bay I reminded myself that the principles of soft-water sailing and iceboating are the same. All you have to do is remember the wind direction and head up to slow down; either that, or ease off on the sheet line to dump a sudden puff. Nothing to it—as long as you think about what you are doing. The only big difference is the high speed and potential for capsizing on the rock-hard surface. And the results afterward.

My new boat seemed to be working quite well. Better than I expected, in fact. The hardened steel runners gripped the slick ice like glue and the front steering was positive and turned the boat with the slightest movement. To keep the speed down I sailed close to the wind, but as I gained confidence I fell off to speed up gradually.

At the center of the bay another boat sailed over and ran alongside. It was the red Arrow of Chris Wolford. He waved, gave me the thumbs-up sign, then sped off as if I were tied to the dock.

His boat is much faster because of its larger sail. But he was also pushing it harder and hiking up on two blades, one of which cut off his brother's finger the week before.

Wolford's brother had been sailing with a friend when their boat came down hard from a hike, throwing both of them onto the ice. Somehow one brother's hand ended up under one skate.

Zip.

Chris Wolford picked up the finger from the ice, packed it in snow, and stuck it in his pocket. Luckily, doctors were able to reattach the digit, but even so—young as he is—Chris still shudders when he talks about it.

I decided to release my sheet line a little.

But still, I zigged and zagged around the snow patches like a kid who had just learned to ride a bike.

Right then I was jolted back to 46 when a sudden wind puff hit me and my leeward runner came up off the ice. My heart skipped a beat as I eased upwind to bring the boat back down. For a long few seconds the gleaming runner hung there as if suspended on a wire. My pulse quickened as I released the sheet line and brought the boat safely down.

For about an hour I sailed the familiar area north of the yacht club, stopping every so often to check the rigging and make sure all the bolts were tight. The other boats came by and ran with me a few times but seemed more interested in racing one another and sailing on two blades.

When I came in for the day, Wolford and a friend were taking a break by their car. Wolford cocked his head.

"Hey Paul," he said, "Does your boat work all right or were you just dogging it out there?"

"The boat works fine," I said, "It's just the old dog that's a little slow."