



# 50

## *Great Boating Innovations*

By the *Boating Tech Team*



*We consider* the deep-V hull, as originally developed by naval architect C. Raymond Hunt during the 1950s, the single most important innovation to occur in recreational boating. Noted for its deep deadrise — the angle the hull makes with the horizontal plane — and a soft ride, Hunt's development comprises a variety of elements that result in much more than just a smooth ride at high speeds in rough water. High chines, even distribution of displacement, flaring topsides and more deliver a drier, safer, truer-tracking ride for boats with deep-V hulls.

We chose the deep-V as No. 1 because the ripple it created continues to affect not just the design of the boats we run but also the very way in which we go boating. Even some pontoon boats mimic the deep-V's basic geometry, and cruisers and anglers today go farther, faster and over more open water than would be widely possible were it not for the most tangible and enduring result of Ray Hunt's genius. For those reasons, the deep-V earns the No. 1 spot.



The 59 innovations that follow the deep-V also continue to send ripples across the sea of recreational boating. Given the huge variety of boat, boater and boating styles, prioritizing these seemed near impossible. So rather than ranking them, we simply present them for your consideration.

**MAGNETIC COMPASS (200 BC)**

One device that requires no power or connection to work and yet provides vital information is the compass. First invented by the Chinese during the Han Dynasty around 200 BC, early compasses were made from lodestone and pointed south, rather than north.

**PROPELLER (1836)**

Let's stop screwing around and rightfully thank British inventor Francis Pettit Smith for developing a "screw propeller" out of wood for boats and using it to propel a 30-foot, 6 hp canal boat.

**ANTI-FOULING PAINT (circa 1880)**

Early ship builders, such as those who built the *Cutty Sark*, nailed sheet copper to hulls to thwart barnacles and growth. Sometime in the 1880s, companies such as Pettit (then Old Salem) and International (known as Interlux to many) began making anti-fouling coatings. Good thing, because pounding nails into fiberglass hulls would be hard.

**WATER SKIING (1922)**

Ralph Samuelson invented water skiing in 1922 on Lake Pepin in Minnesota. He had been enjoying aquaplaning — getting pulled behind a boat on a single planklike sled — and wanted to advance the idea of "snow skiing on the water." He succeeded and birthed a sport, a boat type and a lifestyle.

**RADAR (1934)**

Developed as a rudimentary but functional pulse unit in 1934 at the U.S. Naval Research Laboratory, radar — radio detection and ranging — was further refined by British scientists. The first small-boat radars came from Decca, Furuno and Raytheon as early as 1954. In addition

to its navigational function, radar provides vital weather data for mariners.

**WAKEBOARDING (1935)**

Pinning down the first attempt at aquaplaning — being towed behind a boat while riding a board — is difficult. We can confirm that, in 1935, the American Power Boat Association sponsored an aquaplaning race between Catalina Island and Hermosa Beach, California, that drew contestants from around the world. Wakeboarding remains a global sport to this day.

**NYLON (1939)**

Just think what boating would be like if you needed to lay your anchor and dock lines out on the dock to dry after every outing to prevent them from rotting. Thanks to DuPont and the introduction of nylon at the 1939 World's Fair in New York, none of us need to suffer this fate.

**FIRST FIBERGLASS BOAT (1942)**

The first fiberglass recreational boat was a sailboat molded by one Ray Greene of Toledo, Ohio, in 1942. Greene went on to found a sailboat company and build 175 25-footers. The first recreational fiberglass production powerboat was built by Beetle Inc. in Wareham, Massachusetts, in 1950.

**PONTOON BOATS (1952)**

Currently one of the most popular boat types, the first

**ELECTRIC TROLLING MOTOR (Circa 1934)**

The electric trolling motor as we know it was developed around 1934 by inventor O. G. Schmidt. A man of many ideas, Schmidt had also invented, produced and sold a copper soldering torch from his home in Wheatland, North Dakota. Schmidt decided to move his growing manufacturing operations to Fargo. Because of its proximity to the Minnesota-North Dakota border, Schmidt named the business Minn Kota Manufacturing Co., and that's how the Minn Kota trolling motor got its name.

pontoon available for retail sale is credited to Ambrose Weeres of Minnesota in 1952. Weeres welded barrels end to end and bolted a platform atop the resulting hulls. Today, Weeres is still producing pontoon boats.

**NEW YORK BOAT SHOW (1905)**

In 1905, the first boat show, the National Motor Boat Show, was held at New York's Grand Central Palace. Boats were "trailerized" in behind teams of horses. In January 2017, the National Marine Manufacturers Association will produce the 112th show.



## V-DRIVE (1954)

The first V-drive to become widely available for recreational boaters was built and sold by the Walther Machine Company of Jersey City, New Jersey, in 1954. A V-drive provides a more compact driveline, allowing for more accommodation space in cruisers, and an aft-weighted and less-cluttered cockpit aboard watersports boats. Established in 1927, Walther still builds V-drives today.

## BOSTON WHALER (1956)

The first unsinkable fiberglass-production boat was built by Dick Fisher as a prototype in 1954. The 13-footer was based on a design developed by his friend, naval architect C. Raymond Hunt. It utilized polyurethane foam and displayed a cathedral-hull form. The boat went into production in 1956, the same year *Boating* magazine was first published.

## NMEA (1957)

Founded in 1957, the National Marine Electronics Association originally started as a way for electronics dealers to work better with manufacturers. This led



## FIRST STERNDRIVE (1959)

The Volvo Penta Aquamatic was invented by Jim Wynne (a collaborator and, later, rival of deep-V inventor Ray Hunt, as well as a former Mercury Marine employee) and debuted at the 1959 New York Motor Boat Show. In 1960, Wynne raced a Hunt deep-V powered by twin 80 hp Aquamatics in the Miami-Nassau Race. In 2014, NMMA reported there were 1.4 million sterndrive boats in recreational use.

to the development of the NMEA protocol, which allows different electronics from different manufacturers to communicate with one another in the same language. The first protocol, completed in 1980, was called NMEA 0180, which led to NMEA 1083 and today's NMEA 2000 standard.

## AIRSLLOT HULL (Circa 1958)

In the late 1950s, naval architect Richard Cole

designed the predecessor to the Airlot, the so-called cathedral hull, for Thunderbird boats. The design was made famous as a park-ranger boat used in the TV series *Flipper*. Cole later designed the Airlot hull design for Wellcraft. The design features exaggerated chines and a deep-V center hull that gave the running surface a trimaran appearance. Both stable and smooth-riding, it was available in 16½-, 19- and 24-foot versions.

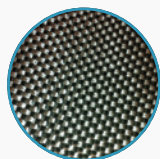


“Today’s AM radio telephones transmit an inaudible carrier wave plus two sidebands and, in the process, waste a lot of power. Soon, single sideband equipment will improve efficiency by about 600 percent.”  
— 1966



## FIRST INFLATABLE LIFE JACKET (1928)

While inflatable life jackets have found prominence in recreational boating in only the past 15 years or so, they have been around for far longer. Peter Markus invented the inflatable in 1928, which was used by Air Force pilots who nicknamed it the “Mae West” because of how it look inflated.



## FIBERGLASS (1933)

Everything from palm fronds to paper had been used as reinforcement for plastic resin. Then, in 1933, a Corning Glass (now Owens-Corning) technician was welding glass blocks together when a stream of compressed air hit some molten glass, coating the lab in glass fibers. Nobody died, and the rest is history.



## FLUKE-STYLE ANCHOR (1940)

When the U.S. Navy sent out bids to create a lightweight anchor with high holding power, Richard Danforth's 1940 design won the contract. Featuring a stock at the crown and a hinged shank, this general type of anchor is the most common recreational boat anchor today.



## POLYESTER RESIN (1942)

In composite structures like boat hulls, the reinforcement (fibers or cloth) provides the strength, and the resin provides the stiffness. American Cyanamid's invention of polyester resin in 1942 allowed for molding products at room temperature and with reasonably quick cure times, spurring fiberglass boat production.



## SONAR (1959)

While World War II submariners had sonar at their disposal, it wasn't until Lowrance came out with its Little Green Box in 1959 that recreational boaters could avail themselves of “seeing” the water's depth and the bottom contour. Lowrance produced more than a million and remains a marine electronics leader.

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## FIRST BOWRIDER (1965)

In the early 1960s, famed designer Carl Moesly and his wife, Jeanne, were launching a boat at the ramp when they noticed a family struggling to handle lines at the bow. Carl came up with the concept of splitting the windshield and putting seating in the bow area, and Jeanne coined the name "bowrider." SeaCraft debuted the 19-foot boat at the 1965 Miami International Boat Show.

## FIRST ADJUSTABLE TRIM TAB (1959)

By inventing the Bennett Marine adjustable trim tab in 1959, Charles Bennett helped to improve a boat's handling and seakeeping in a variety of sea conditions. By adjusting the tabs, the driver at the helm could adjust one or both tabs to extend the running surface and position the boat for a better ride in following, quartering or head seas.

## FIRST INBOARD FIBERGLASS SKI BOAT (1960)

Water skiing originally came to popularity in the 1930s behind wooden inboard boats, but with the birth of fiberglass, competitive skiers migrated to skiing behind outboard rigs. In 1960, Leo Bentz, a Florida ski-school owner, sought to gain a competitive edge by designing the first fiberglass inboard. Bentz later sold the design to Correct Craft, which

popularized the Ski Nautique model and forever changed the tow-boat market.

## FIRST TRACTOR DRIVE (1961)

The first recreational marine propulsion with forward-facing props was a sterndrive-type system called the sea power outdrive. It debuted in 1961 and claimed to "bite hard, undisturbed water and operate more efficiently." Today, Volvo Penta's IPS system and its Forward Drive sterndrives use forward-facing propellers.

## FIRST MODERN CENTER CONSOLE (1964)

Although Boston Whaler's Nauset featured a center

console layout that preceded the Aquasport by three years, the 22-2 is considered the trendsetter that launched the center console into mainstream boating. First built by Fred Coburn and Lennox Sargeant, the Aquasport 22-2 changed the way builders and buyers approached small, personal fishing boats.

## FIRST PERSONAL WATERCRAFT (1968)

Bombardier's Laurent Beaudoin wanted to bring the thrills of his company's famous Ski-Doo snowmobile to the water. Californian inventor Clayton Jacobson II wanted to do that with a motorcycle and had already



"Now that radar is becoming more and more commonplace, it is no longer considered a luxury item, and some of the smallest craft are being fitted with it to increase the pleasure and safety of boating." — 1976



## TRAILER BEARING PROTECTORS (1963)

The California company known today as Bearing Buddy developed the first system for pressurizing and sealing trailer wheel hubs. It replaced the dust caps on wheel hubs, a boon for trailer boaters who were plagued by breakdowns due to water inside the hubs and corroded bearings.



## FIRST PORTABLE MARINE SANITATION DEVICE (1968)

Before Thetford created the Porta Potti, passengers who had to relieve nature's call aboard small boats were relegated to a bucket or hanging over the transom. Thanks to the Porta Potti, boat owners could stow the small, portable device in case of an emergency.



## HYDRAULIC STEERING FOR RECREATIONAL BOATS (Circa 1974)

The history is hazy, but Teleflex began in the mid-1970s. Hydraulic steering offered a vast improvement over cable steering, eliminating steering feedback. The company is known today as SeaStar Solutions, and its hydraulic-steering components are ubiquitous.



## AUTOMATIC OIL INJECTION (1980)

In 1980, Suzuki introduced the first outboard with automatic oil injection, an 85 hp three-cylinder engine. The system negated the need to pre-mix oil and gasoline. Today, virtually all two-stroke outboards — from the Evinrude E-Tec G2 to the Mercury OptiMax — use automatic oil injection.



## DUAL-PROP STERNDRIVE (1983)

Volvo Penta first introduced twin counter-rotating propellers on a single diesel marine drive in 1983, calling it DuoProp. Volvo adopted the idea from Navy torpedoes, where counter-rotating screws neutralized prop torque to keep them running straight and true. Gas DuoProp came in 1986.

PHOTOS: (CLOCKWISE FROM TOP LEFT) COURTESY MOESLY SEACRAFT; COURTESY VOLVO PENTA; COURTESY SUZUKI; COURTESY SEASTAR SOLUTIONS; COURTESY THETFORD CORPORATION; COURTESY BEARING BUDDY



**FIRST STAND-UP JET SKI (1973)**

While Bombardier shelved the original Sea-Doo after just two years, Kawasaki took the stand-up, jet-powered design and ran with it. Today, many people refer to all personal watercraft as Jet Skis, much like how people refer to any tissue brand as Kleenex.

begun work on a nimble stand-up craft with jet propulsion. Bombardier recruited Jacobson who shelved the stand-up and created Beaudoin's Sea-Doo. Five years later, after Bombardier relinquished the patent and licensing rights, Jacobson's stand-up craft would become reality as the first Kawasaki Jet Ski.

**FIRST PRODUCTION RIB (1969)**

The RIB was actually created in Great Britain in 1964 for the Royal National Lifeboat Institution by a team that included former *Boating* contributor Dag Pike. Combining the ruggedness of a fiberglass hull with the buoyancy of an inflatable collar, the RIB design became noted for its seakindliness in

rough seas. Avon, a British Company, introduced the first production RIB at the London Boat Show in 1969.

**EURO-STYLE TRANSOM (1973)**

Credit the iconic Glastron for introducing to the American boating public the Euro-style transom, a design element we almost take for granted these days. In 1973, Glastron employed the design on the futuristic Carlson CV 18 S/S. The brainchild of legendary designer Art Carlson, the CV 18 S/S closed-bow sterndrive runabout carried a suggested retail price of \$6,499.

**FIRST WEST MARINE (1975)**

In 1975, a company called West Coast Ropes opened a

retail store in Palo Alto, California. In 1977, it acquired a mail-order company and changed its name to West Marine Products. In 1987, West Marine published its first mail-order catalog. Between the retail stores and catalog, the company changed the way boaters looked for marine parts and accessories.

**BASS BOATS (1978)**

Combining NASCAR and fishing, competitive bass fishing pushed advancements in hull design and engine development ahead faster than they would have advanced organically. In 1978, Bass Pro Shops offered the first packaged and rigged-to-fish bass boats.

**COMPACT LORAN-C RECEIVERS (Circa 1978)**

The loran (abbreviation for long-range navigation) system of navigational radio beacons had been around since World War II, but the most widely utilized version — loran-C — began its phase around 1957. Yet it was not until the late 1970s and early '80s that receivers small enough to fit on recreational boats became available from brands such as Furuno, Koden, Micrologic and others. Loran-C became a boon to boaters, allowing them to navigate with precision at night and in fog. It was a mainstay until GPS eventually replaced it.

**GPS (1978)**

While AM-radio-based loran had been operational since the 1950s, it was GPS that really made electronic navigation both more accessible and more accurate for the average boater. Conceived as Navstar in 1973, the first satellite was launched in 1978. Today, 32 satellites provide worldwide accuracy to as precise as 5 meters.



**V-6 OUTBOARDS (1975)**

Mercury Marine and OMC (with its Evinrude and Johnson brands) both hit the market with the first V-6 outboards in 1975. While OMC's versions are the most powerful and the first 200 hp outboards, these were essentially expansions of the company's V-4 powerheads. Mercury's 175 hp V-6, on the other hand, was an entirely new design.



“Wires are so passé. Today, a wide range of wireless operating controls and displays are becoming available.”  
— 2006

**ROLLER TRAILERS (1964)**

For shallow ramps, tidal areas, and an increased ability to launch a boat without subjecting the vehicle to the ravages of salt water, we present the roller trailer. The first-patented, all-roller boat trailer was made by EZ Loader in 1964.



PHOTOS: (CLOCKWISE FROM TOP-LEFT) COURTESY KAWASAKI, COURTESY MERCURY MARINE, COURTESY EZ LOADER

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## DSC FOR VHF RADIOS (1997)

The digital selective calling (DSC) system was implemented by the United States Coast Guard in conjunction with the Federal Communications Commission as a means of automatically sending a distress call with your boat's identity and position. In 1997, the FCC issued an order to include DSC on all VHF radios made or sold in the U.S. Today, once you obtain an MMSI number and enter it in your DSC-equipped VHF, with a press of the DSC button, you can instantly send an automated Mayday call to the Coast Guard, as well as boaters within VHF range.

## FIRST 300 HP OUTBOARD (1979)

Mercury Marine stunned boaters with a Goliath outboard for the time — the 300 V-6. The two-stroke displaced 3.4 liters and weighed 565 pounds. Yet it was an engine ahead of its time. It would be three more years before the engine reached dealers, and even then it was not a success. One reason: Many boats of the time could not handle such power and weight.

## FIRST V-8 OUTBOARD (1984)

In 1984, OMC, with its Evinrude and Johnson brands, scored an industry first with a V-8 outboard. The 3.6-liter XP produced 275 hp. Like many innovative engines of the late 1970s and '80s, the XP was a just a bit ahead

of its time. The two-stroke was on the market for just a few years. Yet the XP laid the foundation for the next generation of V-8 outboards more than two decades later — the F350 four-stroke from Yamaha.

## FIRST HANDHELD GPS (1988)

Remember the first cellphones? They were expensive brick-size contraptions. So was the first "handheld" GPS unit, Magellan's tablet-size Nav 1000, which cost \$2,000 at the time of its introduction. Battery-powered with a text display, the Nav 1000 had an adjustable antenna to help acquire position via satellite triangulation. Handheld units eventually shrunk in price and size, growing in sophistication as well. Eventually, mainstream

## EPIRB (CIRCA 1988)

The first electronic position-indicating radio beacon (EPIRB) was a Jotron EPIRB Tron 30S (C/S TAC Number 001), which received official approval for use around 1988. The Graseby (Nova Marine) EPIRB RT 160M was approved just a half-day later. The first ACR EPIRB was the RLB-23, which was approved for use about a year later. Today, EPIRBs and personal locator beacons (PLBs) use a constellation of sophisticated satellites to help locate boaters in distress and serve as indispensable pieces of safety gear.

use of GPS ushered out the old means of electronic navigation: Ioran.

## FIRST CHART PLOTTER (1984)

Paper charts ruled the boating realm for centuries until a small company called Navionics put out the first electronic chart plotter, called the Geonav, in 1984. The small bracket-mount unit, with a separate keyboard with a roller-ball control, signaled the shift into electronic navigation that is all but ubiquitous today.

## MULTIFUNCTION ENGINE GAUGE (1986)

In the mid-1980s, Yamaha Marine debuted its multifunction engine gauge with digital readouts for key parameters such as rpm, trim angle, fuel-flow rate and more. Leading the market by decades, it became the precursor of the multifunction digital gauges offered today by virtually every marine engine brand.

## EFI OUTBOARD (1987)

Electronic fuel injection (EFI) systems had been utilized previously in racing applications, but the first recreational versions were the XRi from Mercury and the Magnum EFI from Mariner (Mercury's sister brand at the time). Reaching dealers in 1987, both engines were 220 hp V-6 two-strokes. The system used computer-controlled technology to compare data from sensors and optimize the air-fuel ratio.

## DIRECT FUEL INJECTION (1996)

Mercury (and its sister brand, Mariner) and OMC (Evinrude and Johnson) both introduced direct-fuel-injected (DFI) two-stroke outboards in 1996. OMC



"Cellular telephones sprung from the marriage of two-way radio and computer technologies."  
— 1986

## "BIG" FOUR-STROKE OUTBOARD (1991)

Prior to this, Honda's biggest outboard was a 15 hp four-stroke. Yet with the debut of the Honda 45 hp model (and 35 hp sibling), boaters realized that big four-strokes were possible. Bearcat made a 55 hp four-stroke outboard in the 1960s, but it never really caught hold. Yet 30 years later, Honda's 45 would spark a revolution and eventually lead to the bigger and more powerful four-strokes we know today.



PHOTOS: (CLOCKWISE FROM TOP) COURTESY ICOM, COURTESY HONDA, COURTESY ACR ELECTRONICS



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## SIDE-IMAGING SONAR (2005)

Humminbird introduced side-imaging sonar in 2005 and received an official patent in 2010. Utilizing a specialized transducer and processor in the display, this technology allowed boaters for the first time to see objects and fish on either side of the boat, rather than underneath like with a conventional fish finder. Other marine electronics brands such as Garmin, Lowrance, Raymarine and Simrad eventually added side-imaging capabilities to product lines as well.

turned to the Ficht system for Evinrude and Johnson, while Mercury and Mariner used Orbital DFI technology. Both systems were plagued with issues in the early stages, but the engines ran smoothly and efficiently. More important, they served as precursors to today's sophisticated E-Tec G2 and OptiMax DFI.

## MAINSTREAM STEP-HULL (1997)

Until Regal Boats introduced the FasTrac running surface in 1997, the step-hull was largely considered a concept for high-performance racing boats. The FasTrac design helped mainstream the performance advantages of step-hulls.

## BREAKING THE 100 HP FOUR-STROKE MARK (1998)

Three years after introducing its 90 hp four-stroke, Honda set the recreational marine industry on its ear by smashing the 100 hp mark for four-strokes. The quiet, smooth-running Honda 130 was an immediate commercial success, finding widespread applications on aluminum freshwater fishing boats and in twin-engine applications on saltwater fishing boats. Yamaha soon followed suit with its 100 hp four-stroke.

## FIRST FOUR-STROKE V-6 OUTBOARD (2001)

Honda and Yamaha finished neck and neck in the race to introduce the first V-6 four-stroke outboard at the turn of the millennium. Both were 225 hp, ushering in the era of the big four-stroke. Both engines featured multiport EFI. The Honda was also equipped with variable valve timing. Weight was a concern among boaters used to the lighter two-stroke V-6

outboards. The Honda tipped the scales at 616 pounds, while the Yamaha was 583 pounds, all told.

## JOYSTICKS FOR SMALL BOATS (2001)

Control Max was featured in the now defunct Maxum line (a division of Bayliner) and featured on boats as small as 24 feet in length. Like today's low-speed docking systems, Control Max used a joystick to move and pivot the boat in any direction. It used three electric thrusters in hull tunnels, including one in the bow and one each in the stern quarters. Besides cost (\$8,000 to upgrade), battery management was an issue. The system never really took off. However, it set the stage for today's low-speed joystick docking system.

## SUPERCHARGED OUTBOARD (2004)

With its line of Verado outboards, Mercury relied on a supercharger to boost the output of a relatively small, 2.4-liter inline-six four-stroke engine block. The initial offering included 200, 225, 250 and 275 hp models,



“Further in the future is the impending discontinuation of Selective Availability, the annoying feature that deliberately makes GPS less accurate.”  
— 1996

but today — some 12 years later — it includes versions up to 350 hp, plus a 400 hp model in the Merc Racing line. Further validating the concept of a supercharged outboard is the advent of the Seven Marine line of engines, which includes beefy outboards from 557 hp to 627 hp — all supercharged.

## WIRELESS RADAR (2015)

Furuno's DRS4W 1st Watch wireless radar proved to the world that it's possible to display and even control marine radar on a mobile device. The compact, 4 kW radome broadcasts a Wi-Fi signal and uses a free app to display radar returns on up to two devices at once. The 12-volt power to the dome draws less than 2 amps. Ⓢ

## SOLID-STATE MARINE RADAR (2009)

The BR24 broadband radar from Lowrance and Simrad brought solid-state technology to the recreational boating market. Unlike other radars of the day, the BR24 dispensed with the old-school magnetron, instead using solid-state circuitry and digital signal processing to eliminate the annoying “main bang” in the center of the screen and detect objects as close as a boat length away. It also drew far less power than other radars, and the emissions were harmless to crew.

