TECHNOLOGY GOES CRUISING

Amoco Procyon incorporates state-of-the-art ideas, materials, and gear into a fast cruising boat. Join a blue-water cruiser of the old school for an evaluation and answer critical questions: What works and what doesn't? Does *Procyon* point the way for cruising boats of the future?

By Ralph J. Naranjo

The revolutionary 65-foot sloop *Amoco Procyon* is more than a test platform for a canting keel and bipod mast; she is a true alternative to the piston-hanking-jib, manual-anchor-and-winch, keep-it-simple kind of boat on which my family and I crossed oceans (Photo 1). The *Procyon* project was conceived five years ago by Pewaukee, Wisconsin, marine-hardware manufacturer Olaf Harken. It was about time, he thought, that cruising sailors were able to utilize the technological advances available to racers. The cruising sailboat Harken envisioned would:

- Be 10 to 20 percent faster than a standard monohull.

Photo 1: With her big rig, *Procyon* is quick and responsive under sail

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• Increase crew comfort by decreasing heel and providing better amenities above- and belowdecks.
• Have a simplified rig so the boat can be under way quickly.
• Allow a small crew to sail the boat even in difficult conditions.
• Incorporate futuristic styling inside and out.

The result of Harken's vision, built at a cost of more than $1.5 million, is a fast, innovative cruiser with a push-button-controlled, roller-furling sailplan flown on an innovative bipod carbon-fiber rig. The big sailplan is balanced by a deep, canting wing keel and water ballast. The boat is equipped with the products of 65 supplier/sponsors, including resin, carbon, carpets, fabrics, solar panels, and financing from principal sponsor Amoco Chemical Company.

In October I joined *Procyon*'s crew for a cruise in the fast lane—a passage on Lake Michigan in 30 knots of wind, whitecaps, and a short, steep chop. Here are some of the reactions of an "ocean-voyaging, bluewater masochist" (as a friend once called me) to cruising on the cutting edge.

■ Rig

Procyon's rig (Photo 2) was designed to accomplish three main objectives: to free the mainsail's leading edge from interference by the mast, to offer a reefing and furling system as simple for the main as it is for the jib, and to make an easily lowered big-boat rig. Only the last function has proved impractical.

Procyon's spar is lighter than a conventional mast and rigging but offers considerably more windage. Reefed for 30 knots of wind, the ratio of sail area to spar surface area is quite small. While the rig is much more efficient than other types of roller-furling or zip-up mainsails, the spar's windage is a limitation on efficiency; in the conditions in which we sailed, the rig and foam-cored hull took the punishment in stride, but at some (undetermined) wind velocity, windage might become a serious problem.

I found that the absence of a spar in front of the sail luff enhances lift and allows a given amount of sail area to provide more drive than it would on a conventional rig. On the other hand, the roll-up sail is cut with less draft and does not have as clean a shape as a conventionally hoisted mainsail.

Procyon: Specs

LOA	65'
LWL	59'
Beam	17'6"
Draft (keel down)	10'6"
(keel fully canted)	11'4"
Displacement	35,000 lbs
Ballast	13,000 lbs
Sail area (mainsail)	1,211 sq ft
(jib)	989 sq ft

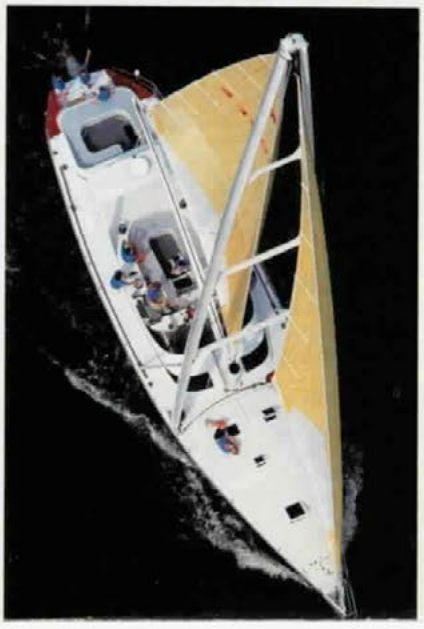
Builders
Hull/deck: Windship Yachts, Kiwi Racing Div., Tampa, FL
Interior: Catalina Yachts, Morgan Div., Largo, FL

Designers
Hull/deck: Britton Chance, Chance & Co., Inc., Essex, CT
Spars: Eric & Ben Hall, Hall Spars, Bristol, RI
Sails: Charles Miller, North Sails Midwest, Pewaukee, WI
Hardware: Peter & Olaf Harken, Harken, Inc., Pewaukee, WI
Interior: Diane Atwood, Atwood Yachts, Chicago, IL
Electronics: Art Ellis & Dick McCurdy, Ockam Instruments, Milford, CT; Eddy Adams, Custom Navigation, Westbrook, CT
Computer analysis, keel/rudder: David Greeley, Atlantic Applied Research, Burlington, MA

■ Sail controls and steering

The heart of *Procyon*'s sail-control system is a 3,000-watt electric/hydraulic pump that uses battery power (24-volt DC) to create a high-pressure oil stream capable of doing significant work. The oil travels through reinforced hoses to turn simple turbinelike motors that run winches, furling drums, and anchor windlasses. Where a linear rather than a rotary force is needed, a hydraulic piston ram replaces the motor, providing energy for canting the keel and autopilot steering.

Photo 2: *Procyon*'s 90-foot mast resembles an inverted wishbone. The function of shrouds in tension is taken up by spars in compression; much of the tensional load is carried by the rod on which the mainsail-furling system rotates. Aluminum struts, from spars to tracks on the gunwale, are part of the rig-lowering system



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Fingertip trimming of the mainsail and jib, from a seat at the helm, was a new experience for me (Photo 3). With a push of a button, I could wind in or out any increment of the 2,200 square feet of sail area.

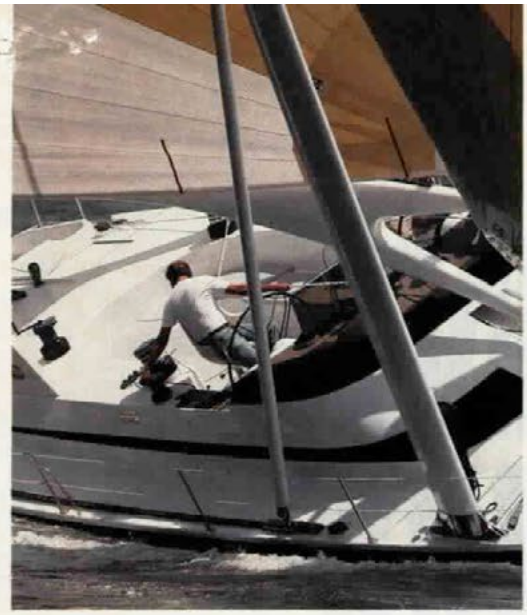
I would have preferred to have one of the two steering stations belowdecks, or at least in a location less exposed to the spray and green water that all too often cascaded over the boat. In all fairness, though, I must say that there aren't any vessels I've ever sailed to windward in near-gale-force conditions at over 8 knots while keeping dry on deck.

The crew as well as the autopilot appreciated *Procyon*'s well-behaved helm. Under sail, the balanced spade rudder and low-friction rudderpost bearings provide a nice sense of one-handed control. As long as the breeze is light, maneuvering under power in tight confines is surprisingly agile; however, stronger breezes caused some changes in behavior. Her light-displacement hull, high-aspect-ratio keel, and massive rig provided good performance under sail but became an anxiety factor when maneuvering in close quarters with a wind on the beam. Perhaps a bow thruster would alleviate some of the difficulty.

■ Ballast

Procyon's articulated lead keel is a deep, thin fin with a bulb with long swept wings; it has been shaped to improve lift-drag ratio and lower the center of gravity. It is hinged just inside the hull to provide leverage that increases sail-carrying ability. On a beat, a touch of a lever moves the keel 22 degrees to windward, increasing the righting moment and lessening heel by 7 or 8 degrees. Canting causes the tip of the leeward wing to dip deeper than the keel foot, compensating for some of the lateral resistance lost by angling the keel to windward.

Procyon's water ballast smoothed out the ride, sped up the march to windward, and wetted the cabin sole. Two thumbs up out of three isn't bad. Such a system has two points for comment: the effect of the ballasting itself



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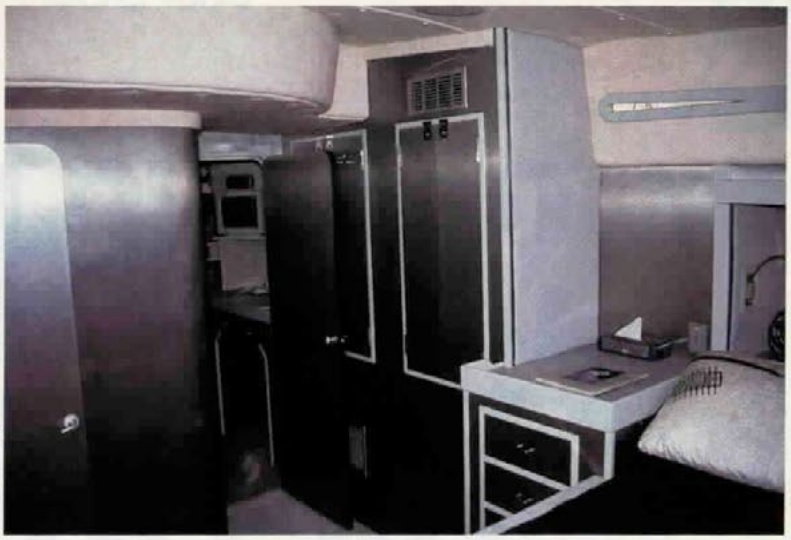

S. Scott Coe

Photo 3 (left): Two Harken #56.2 and #980.2 hydraulic self-tailing winches, mounted just aft of the helm seats, control sail trim. A bank of blocks brings main- and jibsheets and other control lines from underdeck ducts to the winches. Main and jib furlers are hydraulically controlled via push buttons on the coaming-mounted control panel

Photo 4 (right): Belowdecks, traditional amenities with very nontraditional decor: muted gray fabrics, high-tech ceramics, and stainless-steel surfaces

and how it is carried. Water ballast works like the sandbags carried aboard turn-of-the-century sloops. In theory and in practice, part of the heeling moment associated with a large amount of sail area is counteracted through leverage created by water pumped into tanks located outboard and to windward of the vessel's centerline. Like the canting keel, it supplements conventional lead ballast, and carrying less lead definitely enhances light-air performance.

Since capsize recovery is contingent on a vessel's self-righting capability, great care must be taken in calculating worst-case scenarios—when, for example, a vessel is caught aback during a squally wind shift and knocked down on the side of the full ballast tank, or when a seaway rolls over the stern and finds its way into an open companionway. There is room for performance enhancement through the use of water ballast, but the value of righting moment measured in worst-case-scenario circumstances should not be forgotten.

Using the hull of a vessel as one of the sides of a tank works well with steel or aluminum but not so well with fiberglass; welded metal is much more structurally secure than the resin bond between two already cured surfaces, such as the seam between three sides of the tank and the hull. Fully constructing tanks in a shop and pressure-testing them prior to installation can prevent leaks.

■ Belowdecks

Procyon's interior decor comprises alternative textures, surfaces, and colors (Photo 4); sound is dampened by fabric-covered acoustic overhead and ceiling panels, the cored hull/deck, and the carpeted sole. The feeling is of true isolation from the elements—and that, to me, is just what belowdeck accommodations should provide.

Procyon's accommodations are expansive and designed to optimize her role as a recreation base. The spacious owner's cabin contains an athwartship double berth, a large head and shower, and access to an aft cockpit just a few steps from the stern swim platform. Forward of the main saloon are two double cabins.

I have misgivings about the lack of dorade ventilators and the boat's reliance on air-conditioning. I wonder how often an odd wave might find its way through a slightly open hatch—and what its effect might be on the nicely carpeted cabin sole, especially after a season of sailing.

■ Electronic gear

I appreciate equipment that puts additional data in the navigator's hands, and *Procyon* has a fair share of such accoutrements. Navigator's gear includes a Maptech digitized chart system interfaced with GPS and radar (with on-deck repeater) and an array of Ockam instruments that provide boat-speed and wind information. I may have learned to navigate the hard way and crossed oceans with only a compass and a sextant, but I have added loran, radar, and satnav to my boat's nav station. I enjoyed the chance to tinker with *Procyon's* higher-tech gadgets and appreciated the accurate fixes they provided.

■ Conclusions

To a cruising sailor who appreciates performance, *Procyon* represents manageable power, speed, and the ability to grind to windward in breezy conditions. Innovations such as her stylized boom (curved to act as a permanent vang and eliminate the main traveler) proved functional, and gear ranging from hydraulic systems to old-faithful Wilcox/Crittenden heads didn't miss a beat. I believe that her offshore capabilities are limited, but she is a fine boat for general cruising.

Procyon is as much a research-and-development project as she is a finished product. The industry impact from the sum of her components is likely to be even greater than that of the vessel herself.

Innovation is infectious, and Olaf Harken has convinced many in the sailing industry, as well as their clients, to start thinking about new ideas—vessels that will provide the comforts of home, the convenience of easy sail handling, and the performance of a race boat.