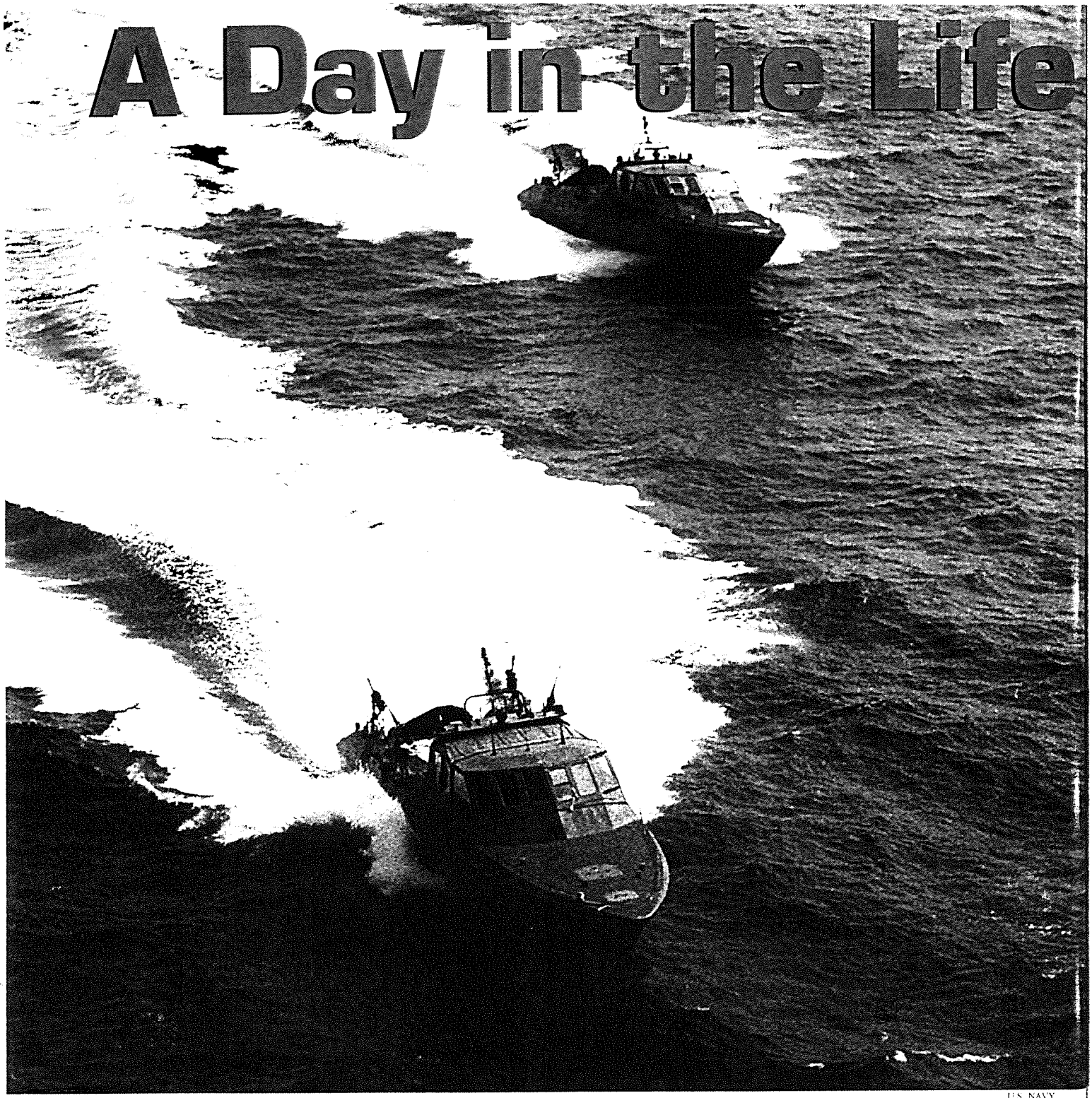
A Day in the Life



U.S. NAVY

by Paul Lazarus

It is likely the world's largest design "firm" devoted entirely to boats. The Combatant Craft Department of the Carderock Division of the Naval Surface Warfare Center consists of 90 people—including no fewer than 22 graduate naval architects and 27 engineers (mechanical, electrical, and general)—most of them based at CCD's main office in Suffolk, Virginia. This historically rich region is dotted with longstanding forts, bases, naval yards, and other government installations. Besides offering CCD a variety of freshwater, estuarine, and bluewater environments for testing purposes, tidewater Virginia contains the highest concentration of military-related boat activity anywhere.

CCD's personnel roster is as big as it is because the mission is considerable. In addition to exercising "full-spectrum, cradle-to-grave" engineering technical support for the U.S. Navy's veritable armada of small vessels—an inventory amounting

Above— *Two MK V SOC (read: "mark-five special-operations craft") cruise beneath the camera of a U.S. Navy photographer. Carderock's Combatant Craft Department was instrumental in the acquisition of these fast, aluminum 82-footers, whose primary mission is special warfare.*

of the Combatant Craft Department—

a singular technical resource for the U.S. military's diverse collection of boats, miscellaneous watercraft, and advanced "vehicles"

to about 3,300 boats, exclusive of target drones and service craft—CCD supports U.S. Army watercraft (approximately 500 vessels) and those of the other armed forces and non-Department of Defense agencies. Moreover, CCD's expertise can be contracted by the private sector, a fact little known throughout much of the marine industry.

For that matter, the Combatant Craft Department itself is little known to the industry. But, rather than run through a lengthy list of CCD's official tasks and assignments—which range from classified research-and-development to routine life-raft-repair certification—let's look at selective aspects of the overall operation. I'll do this by reporting on just a handful of individuals as they go about their jobs in a typical day in the life of the organization.

The Morning Briefing

CCD shares a building with the United States Atlantic Command's Joint Training, Analysis, and Simulation Center. During my visit to CCD, war games were in progress involving all the uniformed services. The shared tenancy tells you something about CCD's joint-services role in the post-Cold War era of national defense. In this time of "chaotic peace," so-called *special operations* have assumed a crucial, "surgical" significance in the U.S.'s ability to respond quickly to crises around the world. Accordingly, much of what CCD concentrates on these days is special warfare (shortened in the vernacular to "specwar"); specifically, different delivery systems for inserting and extracting Navy SEAL teams and other special forces.

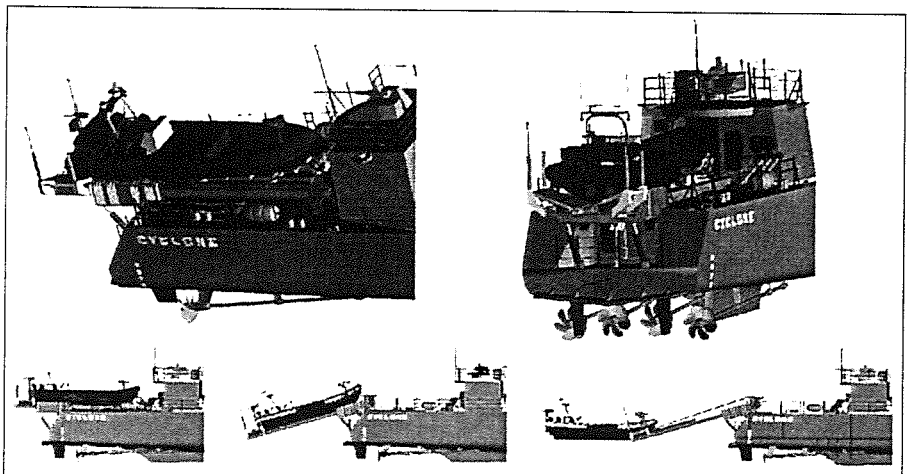
We'll see a sampling of specwar boats and gear, and discuss some of the unique technical problems this type of warfare presents. But first, CCD's Mark Hoggard and Brooks Darden brief me about the Department. Both men, like many of the technical staff here, are experienced professionals. Hoggard, the naval architect who runs CCD, came up through the ranks, having started his government career 33 years ago as a draftsman at the Norfolk Naval Shipyard in nearby Portsmouth. Darden, an engineer and like Hoggard a veteran CCD staffer, handles the Department's administrative duties.

Hoggard and Darden emphasize that CCD focuses its efforts in certain key areas, namely: design; R&D; testing and evaluation; and logistical support and in-service engineering. Which pretty much maps out my itinerary with the Department, so let's try to cover as much of that territory as we can.

Design

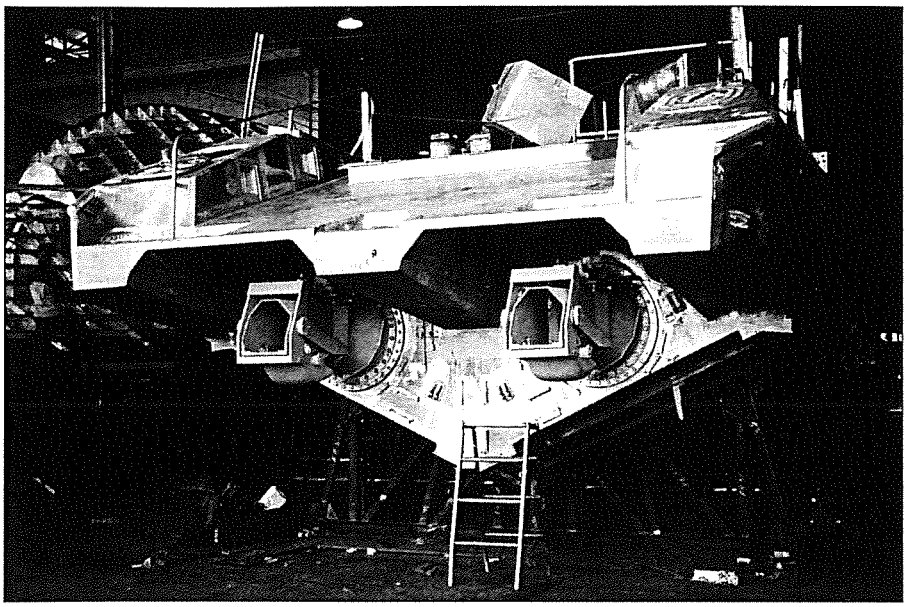
Quite a bit of the design work going on at CCD right now is in systems, subassemblies, components, and vessel modifications, rather than in designing new boats from scratch. For example, CCD has developed a complex, onboard mechanized launch ramp for the Cyclone-class coastal patrol ships, or PCs. The ramp enables these 170-footers to rapidly launch or retrieve a large (10m) rigid inflatable boat (RIB) full of combat-ready SEALs. CCD draftsman Dave Fox, who first began drawing for the Department manually, shows me a graphic display on his computer monitor of one of these big RIBs poised on an articulating set of ways affixed to the stern of a PC. The colored image is a fully modeled, detailed drawing of vivid clarity. And, it animates on command. To produce these pictures at his workstation, Fox uses powerful Silicon Graphics hardware running Anvil 5000 software. The quality of his drawings is so good, CCD engineers were able to determine interferences in the original shipboard setup of the RIB retrieval system without first having to build an elaborate mockup to discover them.

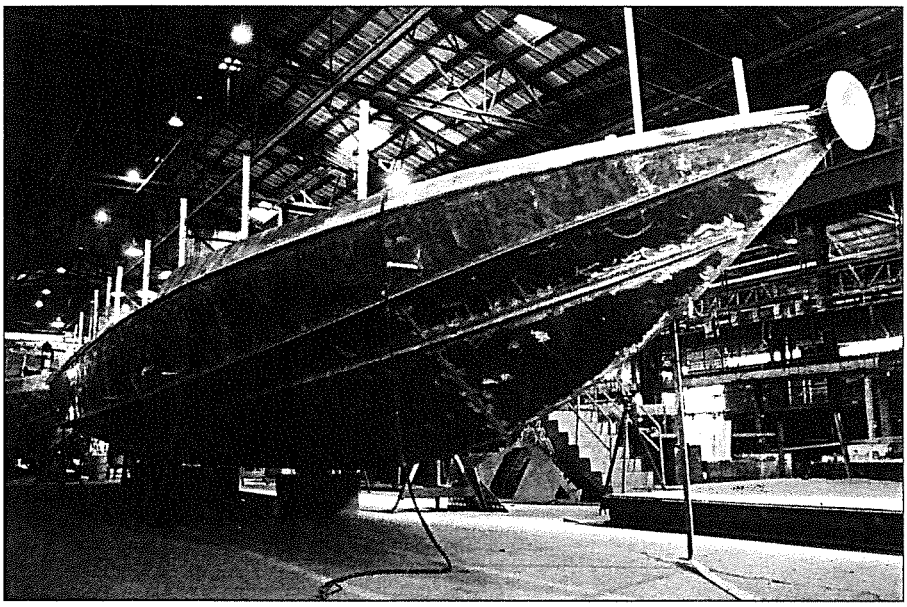
Richard Wilkie, an electrical and electronics specialist, tells me about another project under development. Wilkie is working on an "integrated bridge system" for the consoles of various specwar craft. As the name suggests, this system eliminates multiple pieces of communication and navigation equipment and assorted instrumentation, by combining them into a single hardware package with on-demand computer displays. Because of the brutal service these boats get, the bridge system must be super-rugged *and* redundant. Also, because of operating requirements, the displays must be readable in bright sunlight but not detectable during a night manuever. A tall order indeed, but it's technology that

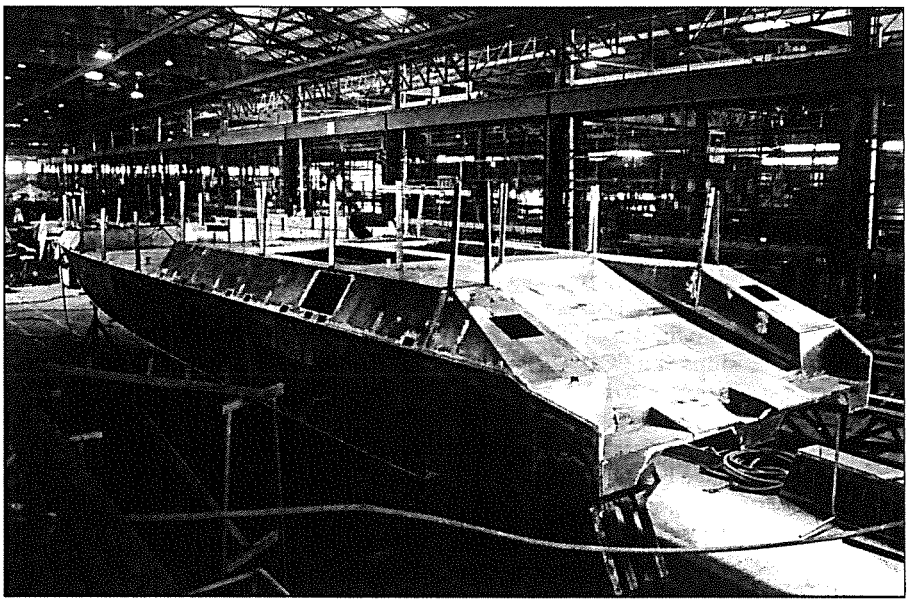


The Department has designed and engineered a complex retrieval system for a "specwar" RIB to be carried aboard the U.S. Navy's Cyclone-class coastal patrol ships (PCs). The lower drawings are three frames from a computer animation of the articulating apparatus.

D.L. FOX







PHOTOS COURTESY OF MK V SOC PROGRAM MANAGEMENT SUPPORT OFFICE

These views of a MK V under construction at a Halter Marine yard in New Orleans provide a better sense of the high-performance offshore capability of this boat. Note the huge KaMeWa waterjets and the deep-V after sections of the hull. The stern ramp facilitates the pickup and delivery of the "combat rubber raiding craft" used by Navy SEALs and other special forces.

will eventually, I'm sure, find its way into civilian applications. (Nor does research stop there: The drivers of these boats look forward to a time when the vulnerable arch-mounted gear—whip antennae, radar dome, nav lights—will be eliminated from view and "compressed" into a protected, low-profile pod of some sort.)

RIBs, PCs, and Mark Vs

By mid-morning I'm en route to the Naval Amphibious Base at Little Creek, in the company of CCD engineers LeeAnn Batkins and Larry Puckette. Consistent with CCD's cradle-to-grave responsibility for assets in the U.S. Navy boat inventory, both Batkins and Puckette serve as liaisons between the Department and specwar detachments: Puckette attends to in-service problems with the PCs, while Batkins sees to specwar RIBs and MK Vs (read: "mark fives"), the latter boat being a high-performance 82-footer.

On this day, Batkins is meeting with members of the Navy's Special Boat Unit 20 to discuss seawater piping leaks on some MK Vs, and also a durable, environmentally friendly bottom paint for its boats. (The coating is called Intersleek, a silicone formulation from International Paint.)

For his part, Puckette and CCD have teamed with an outside contractor (Bolt Beranek & Newman) to develop a forward air-intake silencer to fit the PC's turbos, and we eyeball the silencers already installed on the USS *Shamal*. The retrofit represents a minor but not inconsequential "ship alteration," since the change has reduced high-frequency noise to the extent that engineroom personnel now have unlimited "stay time"—provided they wear double hearing protection (ear muffs and plugs). Prior to this modification, stay time was limited to two hours. The silencer has also reduced noise levels in adjacent compartments, making life on board generally more livable for crew and SEALs alike.

The silencer is an example of CCD's logistical support and in-service engineering. The Department is constantly tweaking the Navy's boats wherever it's possible and feasible to do so. There are

13 PCs on active duty. A fourteenth, still in the design phase at Bollinger Shipyard (Lockport, Louisiana), is undergoing enough modifications to qualify as a next-generation PC. Mike Russell, a CCD naval architect/marine engineer specializing in structures (and a frequent technical resource for this magazine), is on location in Lockport to oversee the work being performed there.

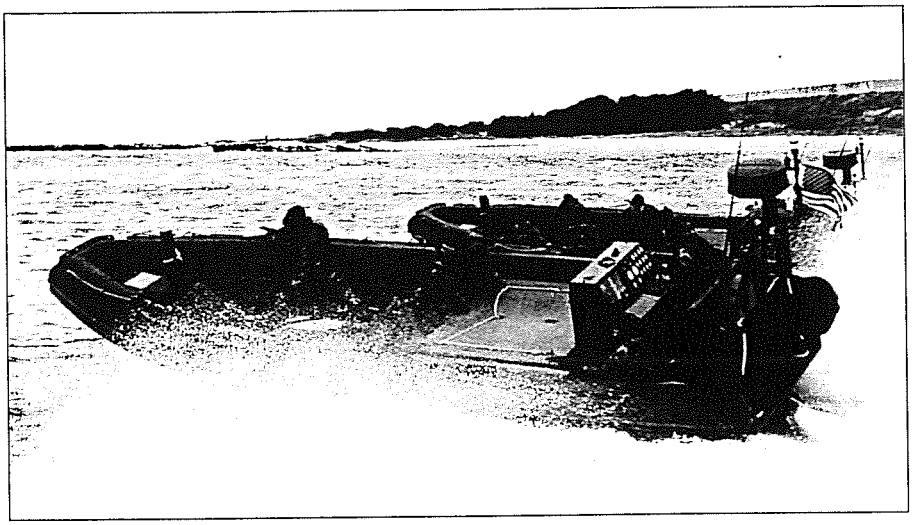
Why, you may ask, with so many brains on staff, didn't the Combatant Craft Department get this ship right in the first place? The best short answer is that the design originated at Vosper Thornycroft (Southampton, England) for a different military mission and was *adapted* for the U.S. Navy and *its* mission requirements. Similarly, the MK V is an out-of-house design that most closely met the performance criteria established by CCD and the U.S. Special Operations Command; that hull was originally developed by Halter Marine Group (Gulfport, Mississippi) for the Mexican Navy. Here, too, the Halter version in use by the U.S. Navy is an adaptation. We'll examine the issue of design authorship later in the article. Right now, let's take a brief tour of a PC and a MK V.

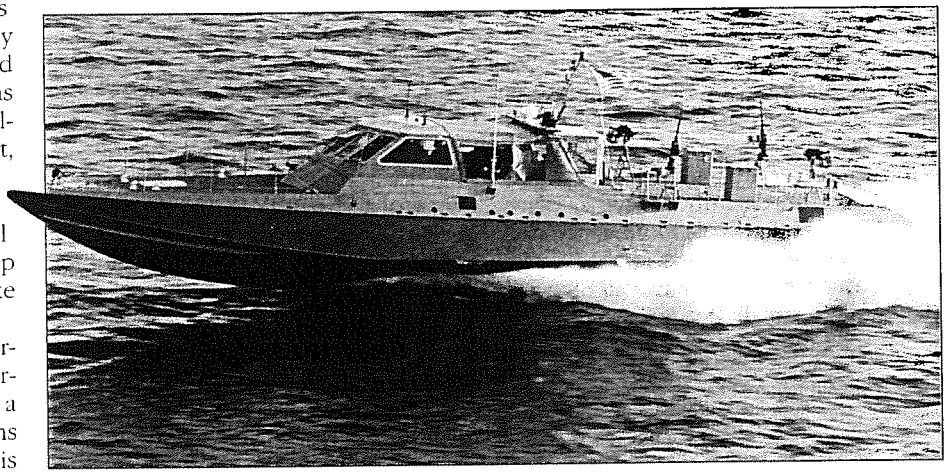
Though smaller than many large motoryachts, the PC is most definitely a warship, with the look and feel of, say, a downsized destroyer. Accommodations are Spartan, and everything in sight is welded metal (steel hull, aluminum superstructure), painted traditional Navy gray. The PC is a purpose-built vessel, its primary mission being to support special operations. The ship is lean (25′ beam), fast for its size (30+ knots, 340 tons displacement), and mean (armament ranges from 25mm guns to Stinger missiles). It's powered by four computer-controlled Paxman Valenta diesel engines rated at 3,350 bhp each.

The aluminum MK V has zero accommodations, not even a head. A crew of five handles the boat; the passengers are 16 SEALs and their "combat rubber raiding craft." Underway, everyone aboard straps into ergonomically designed Stidd seats. Below decks, there's nothing but engine: two monster MTU diesels generate 2,250 hp each and drive KaMeWa waterjets. At a full-load displacement of 57 tons, these engines and this hullform enable the boat to reach speeds of nearly 50 knots in Sea State 2 conditions.

Within a three-day time frame, a MK V and its "prime mover"—a diesel tractor and custom-built boat trailer—can be loaded into a C-5 military transport and airlifted to within range of any hotspot on the globe. These are impressive boats.

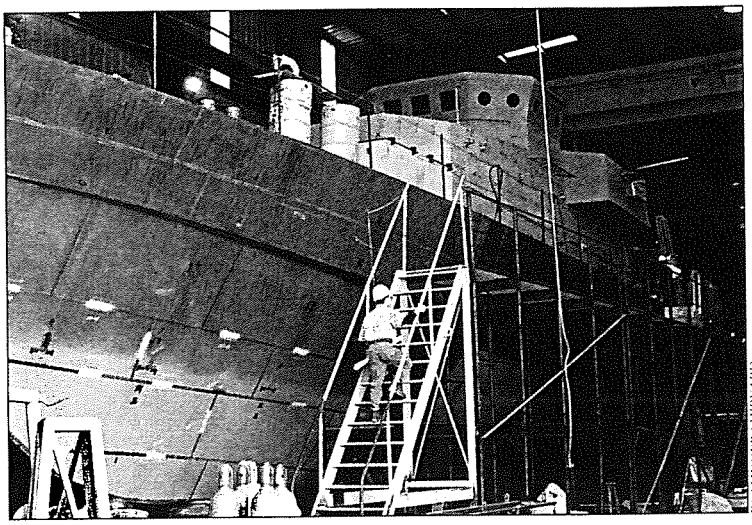
As are the specwar RIBs, most of which





U.S. NAVY PHOTOS; COURTESY SPECIAL BOAT SQUADRON TWO

The current mainstays in the naval special warfare fleet consist of: ***(top)*** *variously sized RIBs, ranging from 24′ to 36′;* ***(middle)*** *the MK V; and* ***(bottom)*** *the "patrol coastal," a lean and powerful 170-footer whose primary mission is to support special operations. PC 12, the USS* Thunderbolt, *seen here in an exercise, was commissioned in 1995.*


BOLLINGER SHIPYARD

A PC under construction at Bollinger Shipyard (Lockport, Louisiana). There is no mistaking this steel/aluminum warship for a large motoryacht. She carries a crew of 28 plus a "payload" of combat-ready SEALs, and can steam at speeds of 30+ knots.

at this base are stored in a secure yard. For now, the specwar community has settled on three basic sizes: a 24-footer (three crew, four SEALs); a 30-footer (three crew, and eight SEALs); and a 10-meter (three crew, eight SEALs). Top speeds vary from 35 to 40+ knots, and power is one or more diesel inboards (Volvo Penta, Iveco, and Cummins, depending on the boat). Boat manufacturing sources also vary, depending on size. To date, the Navy has contracted from Zodiac, Willard, Novamarine, and Bollinger, among others, for these craft.

The boat crews for the RIBs and MK Vs are specially trained; they comprise an elite group within the Navy, and are the basis for numerous stories—even legends—in circulation along the waterfront about boat driving that must be seen, or experienced, to be believed. The boats themselves give every evidence of testing the limits of structural design. Whereas a RIB that enters routine service as a ship's boat in the regular Navy has a design-life span of 15 to 20 years, the RIBs used in specwar are lucky to reach five. Special Boat Unit 20, for example, was "retiring" one of its oldest RIBs, age five; the boat had literally been driven to destruction. CCD, in its capacity as "the authoritative and preferred source of craft design," continues to wrestle with the problem of sufficient structure in specwar craft. Some of the RIBs in service, for instance, were built by one or another system of resin infusion, which delivers a high-quality lightweight laminate. But the question is: Is such a laminate tough enough to handle accelerated *fatigue* loading?

Nor is the problem of sufficient structure restricted to RIBs. Some of the MK Vs—all built to strict ABS (American Bureau of Shipping) standards, as specified—are being beefed-up to correct structural deficiencies that have emerged only as the boats age in service. The fact is, specwar may soon redefine the structural limits of truly

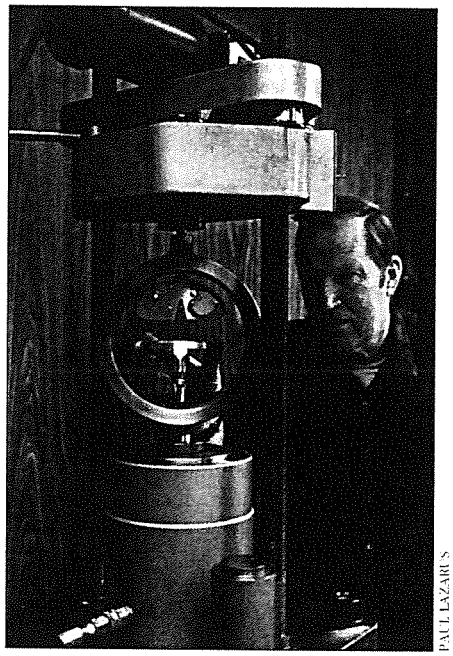
high-performance offshore craft, for military and non-military applications alike.

What are the limits anyway? Nobody knows. But if anyone is capable of quantifying them, it would have to be the Combatant Craft Department's Test and Evaluation Group, directed by Jim Lewis.

Testing, Testing

I'd wager that this group has more instruments warehoused than even the biggest boat-manufacturers have working. CCD conducts extensive instrumented trials on hulls, and on electrical, mechanical, and propulsion systems in order to quantify performance characteristics. The group recently moved its field-lab operations to Fort Monroe in nearby Hampton, an installation on Old Point Comfort at the edge of Chesapeake Bay, which gives Lewis' staff additional shop space and easy access to different bodies of water, from open ocean to riverine conditions.

Lewis and his crew *love* to test things, and they frequently fabricate an appropriate instrument or two when off-the-shelf items simply will not suit. Much of the testing being done here is directly transferable to the private sector, where



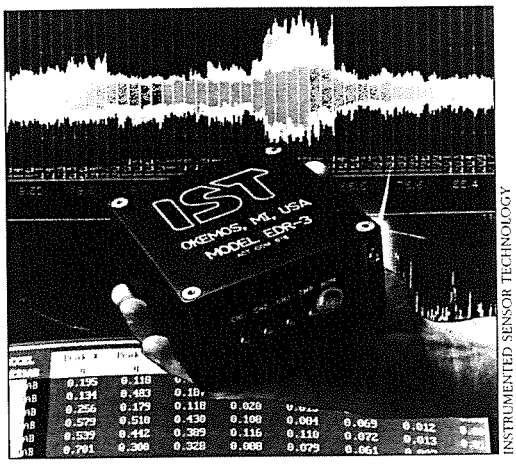
PAUL LAZARUS

Lab manager Al Miller calibrates a "proving ring standard" in the Combatant Craft Department's testing facility at Fort Monroe, Virginia. CCD conducts extensive instrumented trials on hulls and marine systems to quantify performance characteristics.

it is hard to find. The *Gentry Eagle*, for instance, a British-built, U.S.-owned 110'aluminum raceboat that is now a motoryacht, was designed 10 years ago to break a transatlantic speed record. Her sophisticated propulsion systems include both diesel-driven waterjets and gas-turbine-driven, partially submerged propellers. CCD made performance measurements on this vessel during a two-week period after the boat returned from its successful Atlantic crossing.

When I visited CCD's Fort Monroe facilities, the first thing I saw in the machine shop was a black-painted 40-hp Mariner outboard set up for specwar; it had an unusual metallic "growth" just below the engine cowl. The add-on equipment, Lewis explained, scavenges exhaust and attenuates sound. Another outboard, this one a Tohatsu, was rigged to run on a less-flammable diesel/kerosene fuel mix. Both motors were undergoing a series of acoustic and performance tests. Let's hope these tests bear fruit, because not just the specwar, but also the recreational marine, community could benefit from reduced sound and flammability

A "black box" similar to the sophisticated "disaster data" recorders now installed in Indy racecars, aircraft, and other sensitive applications. CCD is using these devices to develop a real-time telemetry system for improved evaluation of sea trials.



INSTRUMENTED SENSOR TECHNOLOGY

(and improved emissions) in two-stroke outboards.

Lab manager Al Miller walked me through the warehouse, which is chock-full of testing and recording equipment. This stash represents some 30 years' worth of accumulated scientific gear, since that's about how long the Department has been testing and evaluating Navy boats in the Norfolk area. (For a capsule history of the Combatant Craft Department, see the sidebar on page 53.)

Because their tenure with the Department goes back decades, both Miller and Lewis are fully familiar with every item on the shelves. They can recall what each piece was used for and when, and probably, if pressed, the degree of precision attained with it. CCD's technical staff has, on average, 15 years' experience with the Department, so the institutional memory—and continuity—is atypical and illuminating.

The Department maintains a second test facility farther up the Bay at the Patuxent River Naval Air Station in Maryland. This site offers a protected harbor, a massive synchrolift, a high-bay hangar with overhead crane, as well as close proximity to weapons ranges and a C-5 capable airfield.

Back at the Suffolk office, Lewis shows me a small "black box" that may help answer lingering questions about the destructive dynamic loads to which the specwar boats are subjected when running at high speeds in heavy seas. Made by Instrumented Sensor Technology (Okemos, Michigan), the device is at the heart of a data acquisition system that CCD is developing for more sensitive and accurate field-testing. IST's sensor-recorder has six-channel capability; several units can be stacked in a boat like a beehive, or arrayed in different parts of the hull. The box measures and records accelerations, say, but a telemetry system still being de-bugged by CCD electrical engineers Tom Kush and Kelly Haupt would transmit data in real time to computers on shore. It's the kind of information builders of high-performance offshore powerboats would, uh, kill for.

Basic Boats and Conventional RIBs

Let us not forget that, however interesting the specwar stuff may be, most of the Navy shuttles between ships and shore at slow-to-moderate speeds in variously sized standard-issue utility and personnel boats, or landing craft and motor whaleboats, and in the now-ubiquitous RIBs. Not to mention miscellaneous watercraft, such as oil-spill

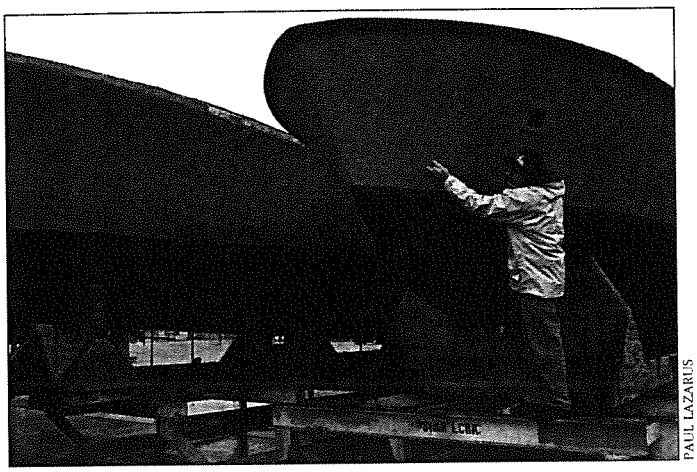
WILLARD MARINE

At Willard Marine (Anaheim, California), a crane lifts a newly finished 24' RIB for delivery to the U.S. Navy. Also in the yard, 15m (50') FRP utilities destined for the fleet are seen in different stages of completion. The Combatant Craft Department designed the Navy's present diverse portfolio of conventional boats.

and salvage boats, dive boats, workboats, yard patrol craft, admirals' barges, target drones, and more. All come under the purview of the Combatant Craft Department, which also, by the way, scratch-designed most of them for the Naval Sea Systems Command.

CCD technician Buddy McKinley, who started out in Norfolk Naval Shipyard's boatshop, follows the life cycles of much of this fleet, especially those boats built of fiberglass, which is his specialty. On the second day of my visit, we return to the outer yard at Little Creek to survey some boats that are scheduled to go inside the boatshop there for needed repairs. A number of the boats in the yard seem to share two problems in common: first, blistered topsides due, McKinley thinks, to a fire-resistant polyester resin employed in the hull laminate; and second, battered or missing rubrails.

The immediate fix to the first problem is to grind away the offending blisters and re-laminate. (Vinyl ester resin in the newer boats has eliminated the problem at its source.) The solution to the second problem—torn and broken rubrails, usually caused by bad or careless boat handling—has, fortunately, been found. What remains is to gradually retrofit the



PAUL LAZARUS

CCD's Buddy McKinley examines blisters in the fire-resistant hull laminate of an older, Navy boat. Note the damaged rubrails. Newer vessels now wear tough, molded-polyurethane sheer, stem, and quarter guards developed by the Department.

fleet. The fix in this case is a molded, formed-in-place rubrail made from a tough polyurethane formulated by Products Research & Chemical Corporation (PRC), now part of Courtaulds (Gloucester City, New Jersey). These rubrails have stood up well to repeated abuse, which is what the boats get executing alongside operations and docking.

The other item McKinley wants to check on at Little Creek is the condition of specially ordered Kevlar-reinforced lifting lines, which CCD has specified for lifting RIBs aboard their mother ships. The original cordage stretched too much for some davits and boat-storage arrangements; also, the original slings had a manufacturing flaw that caused premature failure—a nasty prospect when the boat is being hauled up to deck level in a seaway. But the Kevlar lines and replacement slings appear to be working just fine.

Designing vs. Adapting

Group leaders at the Department occupy a series of small offices along an exterior wall of CCD's large floor plan in the Suffolk building. I stop in to see Bob Bradford, who heads up the In-Service Engineering Group. He is preparing, after hours, the electricals chapter of the long-awaited *Principles of Small Craft Design*, a work-in-progress slated to be published by the Jersey City, New Jersey-based Society of Naval Architects and Marine Engineers. (Christine Schleicher, a naval architect at CCD, has overall responsibility for this book project.) Because *Professional BoatBuilder* is currently compiling a marine products classification system that we've named PILOT (Product & Information LOcator Tools), Bradford talks with me about the latest edition of *Standard Specifications for U.S. Navy Craft*. It is a system worked out years ago for internal use, which codifies everything from "Care of Craft During Construction" to "Armament Installation." The manual contains more entries than most readers of PBB need; nevertheless, the Navy's system has been very useful to *Professional BoatBuilder* as a paradigm for the still-unfinished PILOT series.

Next door to Bradford's office is that of naval architect Mack Whitford of the Hull Group, which is responsible for

hydrodynamics, stability, arrangements, and structures. It is with Whitford that I take up the issue of design authorship mentioned earlier in this article. He tells me that higher powers have directed the Department to seek out "commercially available technology" in boats and gear where feasible, in order to minimize design and construction costs, and to reduce lead times. This policy is part of an overarching "acquisition reform" affecting all DoD agencies. It is credited, for example, in making it possible for the MK V program to go from "concept development" to an operational detachment—including two boats, the tractor-trailer rigs, and support equipment—in less than three years.

Whitford acknowledges that there are those within the Department who would prefer to design precisely what the Navy needs rather than go shopping for a close approximation—and then have to modify it. The first iteration of the Cyclone-class PC, adapted from an existing Vosper design, has been lengthened and radically re-propped, among other modifications to it both major and minor. Similarly, some CCD staffers now wish the MK V had been built in composites to better withstand the structural stresses these boats are obviously experiencing.

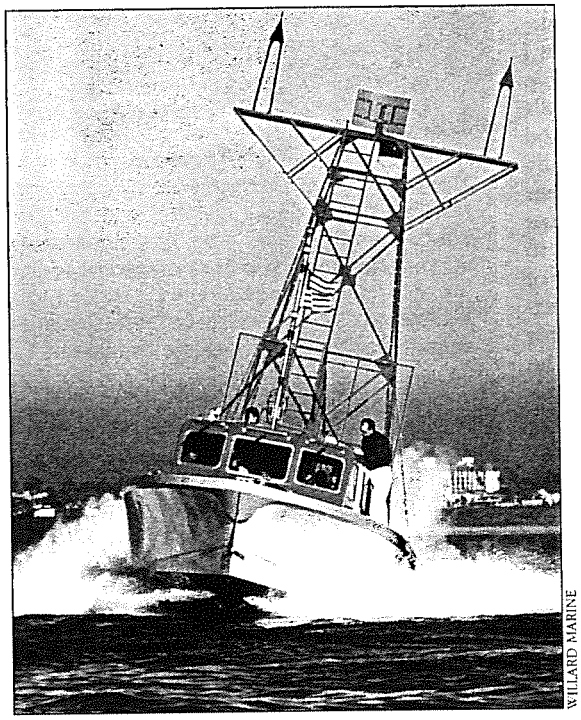
Such reform in Navy small-craft acquisition programs—particularly those boats intended for special operations—is described from time to time with different bureaucratic jargon, but really, the practice is nothing new. Consider, for instance, the PT Boat. Like the MK V, the PT was conceived as a small, fast, attack craft, fighting unconventionally (compared to larger surface ships of the day). The PT and MK V are even of about the

Three Decades of Development

For a large part of the past 50 years, U.S. Navy policy makers have been in apparent denial about the continuing strategic value of small combatants. PT boats proved their worth in the Pacific Theater during WW II, but the program essentially dead-ended after the war, and the boats were scrapped or sold as surplus. During the Korean War, the Navy often found itself needing small fast patrol boats along the Korean peninsula—but had none. Finally, in the Vietnam War, when the Navy realized it could not conduct effective riverine warfare or special operations with its exisiting assets, it restructured the small staff of boat designers assigned to Navy headquarters in Washington, D.C., and created a boat design and test evaluation group based in the Norfolk, Virginia, area. It was 1967, the year the Combatant Craft Department (CCD) marks as its true beginning.

Originally named the Combatant Craft Engineering Department, CCD has physically moved in the greater Norfolk area several times since, relocating to its present facility in neighboring Suffolk in 1993. The Department has also moved several times within the Navy's table of organization; CCD became part of the Carderock Division of the Naval Surface Warfare Center in 1992. (For a closer look at Carderock's Maryland headquarters, see PBB No. 42, page 39.) Along the way, as CCD's role enlarged in scope and significance, its staff has expanded from an initial complement of fewer than two dozen to a crew now numbering 90.

—Paul Lazarus



WILLARD MARINE

A 17m Navy target drone, designed by CCD and built by Willard Marine, undergoes trials in Alamitos Bay off Long Beach, California. Powered by three 454-ci gas engines, the hull has a vacuum-bagged foam core.

same length. Four years prior to Pearl Harbor, a design initiative begun by the Navy gave the service the requisite performance criteria with which to launch a design competition that brought in entries from commercial boatbuilders. The Elco version that won the first production PT boat contract was, not incidentally, based on a proven British design being marketed by a U.S. firm. (The Navy subsequently deployed additional, "alternative" PTs—designed and built by the Higgins and Huckins firms—during the war, along with a second, much-altered Elco.)

Similarly, during the Vietnam War, the Navy turned to commercial boatbuilders for a suitable design in the 30′ range for in-close riverine warfare. The now-defunct United Boatbuilders beat out seven other companies to win the production contract to build twin-waterjet-driven PBRs. (The acronym stands for "Patrol Boat, River"; it is the 31-footer featured in the movie *Apocalypse Now.*) Hatteras Yachts (New Bern, North Carolina) might have won that competition had the project there not ended abruptly with the sudden death of founder Willis Slane.

As for the MK V, the Combatant Craft Department provided preliminary sizing and feasibility studies, conducted a market survey, developed the specifications, and coordinated its research with the Army and Air Force, who figured into tactical scenarios. The Special Operations Command, CCD, and others narrowed the field to three candidate vessels ("test articles"): a power cat from Peterson Builders (Sturgeon Bay, Wisconsin), and two different monohull designs from Halter Marine. Interestingly, the rejected Halter boat was of glass/Kevlar construction.

In fairness to CCD's testing and evaluation of the boat selected, the Department pounded the Halter prototype in sea trials—cracking welds, breaking seats and windshields, causing the engines to shut themselves down, and even partially flooding one of the

enginerooms when the hull was holed. As a result of those demanding test-drives, the Department revised its original specs prior to the first production run. But as we've seen, it appears more revisions may be in order.

Many of the Navy's small combatants, from the PT boat to the present, have had similar, nonlinear histories of technical development. As good as the Combatant Craft Department is—and few would dispute its demonstrated expertise—predicting actual operational performance in light of constantly changing armament, payloads, and mission requirements has always been a tough nut, despite dramatic computer-related advances in naval architecture and marine engineering. The Navy, for example, though quick to recognize the potential of Ray Hunt's breakthrough deep-V hullform, so overloaded an early Bertram 31 with weaponry that the boat was unable to get up on plane. (I should note that this failed experiment predated the formation of CCD.)

None of these persistent technical problems plague the Navy's conventional boats. There, CCD has a large library of drawings, the bulk of them having been generated in-house for boats that enjoy a long design-life span, during which the ailments tend to be comparatively minor, such as the blister or rubrail repairs cited above.

I do not wish to suggest, by the way, that the current acquisition policy has caused discontent within the Department. To the contrary, CCD strikes me as being one of the most upbeat and cohesive government agencies I've encountered in 30-odd years of reporting. There is a palpable sense of productivity here. Moreover, that policy by no means diminishes the depth or value of a CCD technical evaluation. The Department, for instance, recently evaluated a proposed, privately designed 27′ fast power cat for U.S. Customs. Without that assessment, the Nite-Cat, as the design is called by its developer, would still be looking for a buyer.

By now I'm out of time at CCD. I didn't even get to talk with the Systems Group about prototypes of promising electric-propulsion systems on high-speed patrol craft.

But that's another story. PBB

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Dealing with the Department

These are not the old days. CCD has streamlined its procedures for dealing with the private sector. Here's what you do:

Fax a brief description of the job you've got in mind. CCD will respond with a cost estimate and schedule. According to program manager Ron Warwick, who is CCD's point of contact for outside jobs, "Even a phone call will suffice."

Only a one-page indemnity agreement is required. Once an agreement has been reached and funds ("They can be incremental," says Warwick) are provided, the work will begin. Warwick further pledges that CCD will offer its customers "frequent reviews and financial and progress reports." The Department aims to please.

Contact Ron Warwick at 757–686–7268.

—*P.L.*