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REVOLUTION IN FIBER RIGGING
A WORLD OF STANDARDS
REFRIGERANT ROULETTE
ALAN ANDREWS

By the Rules

California yacht designer Alan Andrews specializes in helping clients win races under the rating rules of the day.

DICK FOAT

by Dan Spurr

Making a name for yourself in the yacht racing game isn't easy. One way in is to find a well-heeled client willing to gamble on a young designer. Another route is to build the boat yourself, hoping your ideas are better than those of the designers you're competing against. And that takes a liberal dose of self-confidence.

For his first boat, Alan Andrews chose to jump into the competitive world of development-rule racing. But he still needed investors. The Southern California designer's first effort was to gather four yachtsmen to build a 30-footer (9.1m) to race the 1981 Midget Ocean Racing Club (MORC), which had developed a rating system for small boats in the late 1950s that offered beginning designers an opportunity to compete at relatively low cost. Two days after the agreement one of the partners failed to get a bank loan and the arrangement fell apart. With the 1982 MORC international championship coming to Marina del Rey, attracting more than 30 entries from across the U.S. and Canada, he tried again.

"Some of the guys I'd been racing with," he says, "were looking for the next thing in their lives. So we put together a syndicate of eight and put sweat equity into it. Dencho Marine built the boat. Dennis [Choate] did the hull, deck, keel, rudder, and paint job. We helped with fairing, deck hardware, and everything else. We won the MORC Nationals with that boat. *Details* beat Bob Evelyn and his Hall Spars crew, and Carl Schumacher's Express 27 and CAPO 26. On a handicap basis it proved faster than most of the 30s that came out that year."

Explaining how he'd approached the design, Andrews says, "It was a fast boat but it did look at the rating rule, though we didn't tilt it fully

toward MORC. We looked at weight distribution. The MORC has a stern measurement that encourages you to distort the stern, to lift it up. That was a conscious thing we looked at. We also looked at fore-and-aft distribution of volume. There were a lot of other little things as well that added up."

As happens in the world of racing, owners flock to a winner. *Details*' win in 1982 led to a number of important relationships for Andrews. A 30-footer named *Short Circuit*, built by Jim Betts, then in San Diego (see "Survivor II," PBB No. 129), won her class in the 1986 Internationals. The latter encouraged a yachtsman in Cleveland, Ohio, to order a version of it, and several others that were built by Hayden Gozzard at Scorpio Yachts in Exeter, Ontario, Canada, and Andy Wiggers (Wiggers Custom Yachts) in Bowmanville, Ontario.

Andrews: "Those were the days when there was good development-rule racing in the MORC class. Going back to when I was working for Doug Peterson, there was Half Ton and Quarter Ton racing. There was none of that after about 1980 in this area. MORC came in for development-rule racing. You could build a small boat and compete on a good circuit with a good fleet, particularly on the Great Lakes, as well as Florida and the Chesapeake Bay."

PBB+ For more on yacht racing handicap systems, visit ProBoat.com.

Andrews had found his niche.

A Natural Choice

It's not surprising that Andrews chose a career in yacht design. He has been sailing nearly all his life; from an early age, that's about all he wanted to do. His parents and grandparents sailed. Family vacations were borrowing grandfather's Owens 40 cutter (12.2m) for a week's cruise. His offshore racing résumé begins in 1973 and includes just about every major event in the Pacific Ocean and Great Lakes: the annual Transpac Race from Los Angeles to Honolulu; Newport Beach to various ports in Mexico (Ensenada, Cabo San Lucas, Manzanillo); Hong Kong to Hainan Island, China; Victoria, B.C., to Maui; the several Mackinac races on Lakes Huron and Michigan... it's impressive. The early races were aboard production boats like the Cal 40 and North American 40, but beginning in the early 1980s, when his design career got under way, most of the races have been aboard his own designs, ranging from 39′ to 80′ (11.9m to 24.4m). And he's occupied nearly all the on-deck positions: trim, crew, watch captain, and helm.

DAN SPURR

Facing page—*Alan Andrews gathered a group of fellow racers to build the 30′ (9.1m)* Details, *which was first overall in the 1982 MORC International Championships at the California Yacht Club in Marina del Rey.* ***Above***—*Andrews earned a degree in mechanical engineering from Stanford University, but pursued yacht design, opening his own office in Long Beach, California, in 1979.*

When it came time for college, Andrews looked at the several U.S. universities specializing in naval architecture—Webb Institute, Massachusetts Institute of Technology, and the University of Michigan—but two factors intervened: first, his parents counseled that yacht design was a narrow specialty and he might be better served in life with a degree in a broader field, such as mechanical engineering; second, as a Southern California boy he wasn't too keen on spending winters in the snowy north. Stanford University in the Bay Area had a strong engineering department, and the faculty offered flexibility that allowed Andrews to divert wherever possible into small craft design. Plus, the school sponsored a good sailing team competing on Flying Juniors and Lasers. So he signed on. "We were practicing two to three times a week, racing on weekends," he told me during a visit to his office on the water in Long Beach last spring. "A lot of things clicked and I became a much better sailor." In 1976 he earned All American honors.

In the classroom he made do with the curriculum. The only course specific to yacht design was taught by a sailmaker. "He'd walk in in flip-flops, long hair, and untucked shirt," Andrews remembers. "He was the winning Transpac navigator on the Bill Lee 35′ [10.7m] *Chutzpah*."

For drafting, Andrews cast his own lead ducks in a shop class at Stanford and bought a planimeter at a surplus store for $15.

Meanwhile he got a good introduction to the foundations of yacht design and construction, with courses in fluid dynamics, structures, FEA (finite element analysis), and some early CFD (computational fluid dynamics).

First Job

The summer of his junior year Andrews got a job in Doug Peterson's office; Peterson was an innovative and highly successful designer of performance sailing yachts, and the opportunity was perfect for Andrews.

That same summer Andrews coached at the San Diego Yacht Club in the afternoons, further developing his on-the-water skills.

On graduation he began applying for jobs in design offices. He spoke with Olin Stephens, who told him he wasn't hiring, and when he was ready he was going to hire Bill Langan. "He was up front," Andrews says respectfully.

"After a few months doing boat work to pay the bills," he went on, "I was introduced to Dennis Choate [Dencho Marine] and Dennis was looking for somebody [see "Survivor," PBB No. 126]. I went to work for Dennis doing in-house design work and hardware installation as well as supervising some of the guys in the shop. At that time, Dennis was starting to build the CF 27s, a Scott Kaufman design, and building the CF 41 of his own design as well as Gary Mull's CF 33. I helped a lot with a boat called *Arriba*, a Bruce King design for another builder. The project fell apart and the partially completed hull became available, and Dennis and his investor bought it. We looked at it and determined that was not the shape we really wanted. It should have less IOR [International Offshore Rule] distortion in the stern, and we saw a few things in the bow we wanted to change, so we got in with a saw, cutting, and adding. Dennis has a good eye for boats. He was the lead on the project. There were significant parts where he said, 'Here's what we want to do.' I'd draw on the boat and say, 'Yeah, let's do that.' I was the lead on the sail plan. By the time it got launched and ready for Transpac '79 I'd done a lot of work helping Dennis's boats get measured, and developed a decent understanding of the IOR. *Arriba* was really a King/Choate/Andrews design. The boat went well and won the Transpac in '79, Class B and overall. It achieved its goal."

That year Andrews hung out his own shingle in Long Beach, picking up work here and there. He offered his services to other design offices. Bruce King in Newport Beach returned his call and asked him to come in to do drafting for a week. Dennis Choate referred Andrews to a client in Seattle who needed help getting his boat ready for race season. And a former shop foreman at Dencho Marine had a client for whom Andrews designed the hull, keel, rudder, and sail plan. Additionally, he found work around the country mostly helping owners with their IOR ratings, which often involved keel and rudder modifications. He established relationships with the dealer for the Peterson 34, a hot boat at the time, and with North American 40 owners, improving performance for those who had a bit more money to spend to stay competitive. The work was varied, ranging from changes to appendages, sail area, propellers, flotation, and ballasting.

Andrews: "At the same time, I was working with Sparcraft (Irvine, California) developing their racing spars, and used my engineering knowledge to help put numbers to setting up the spars. Before that there was a lot of: 'A Two-Tonner uses this, this, and this.' I put numbers to it so they could reduce drag and weight, and develop the appropriate bend characteristics to adjust sail shape. I was the prime consultant to Sparcraft for most of 1980 and '81." In those days the boats were rigged with wire or rod; since 2000 Andrews has specified PBO and carbon fiber rigging for many of his projects.

"You never want it to be the designer against the crew. There are plenty of smart people in the world and if someone has some ideas to make things better, you want to be sure to incorporate them."

—Alan Andrews

The IOR Era

The beginning of Andrews's career coincided with the heyday of the IOR, a handicapping system based on measurements at specific points on the hull. The unfortunate result was a boat that was not particularly handsome or as fast or mannerly as it might have been. But maximizing one's advantage with the IOR was an intellectual challenge.

After Andrews's success with *Details* in the 1982 MORC, one of his clients, for whom he'd done some "rating work," ordered a One-Tonner. *Allegiance* was built by Dencho Marine with advanced materials and processes for that time: epoxy foam core, carbon inside skins, and S-glass outside skins. She was launched in December 1983 and won her class at the 1984 SORC (Southern Ocean Racing Conference).

On the West Coast, the ULDB (ultra light displacement boat) 70 (21m) market was gaining interest. "We were helping owners optimize under the IOR," he says. "We worked with several owners doing new keels and new rigs for Santa Cruz 70s. Bill Lee boats were long, and shy on sail area; the Nelson/Marek boats were short, and high on sail area. *Ragtime* was really short, and *Drifter* met its demise in Mexico and was no longer part of the game.

"Even with ratings the racing was close. Usually it meant you wanted to rate near the top of the rating band that gave you boat speed, and allowed you to put the boat at the head of the pack so you weren't fighting through dirty air."

The summer of 1989 Andrews designed the 56′ (17m) *Medicine Man* for Bob Lane, who wanted a boat that was fast like a ULDB 70, especially for downwind races to Mexico and Hawaii. He talked with Dennis Choate about a 56′ ULDB that would rate under IOR. Andrews says it was very successful, a sort of demonstrator model for what he could do with the 70. It enjoys a long and illustrious career, beginning with a first-to-finish in the 1991 Newport to Cabo San Lucas Race.

Andrews: "By '89 the IOR had made changes that gave you sail area for free; they extended the mainsail batten length and put max girth limits on mainsails that were bigger than mains had been before. This allowed mainsails to be built bigger for the same rating because they essentially doubled the batten length, which could support bigger roaches. The Nelson/Marek boats were still short but had lots of sail area. And Bill Lee boats that didn't have enough sail area for light air now had enough. It allowed the longer boats to speed up and be faster in all but very light air."

When starting a new project Andrews studied boats competing, the fast ones and those off the pace. Just when it seemed there were not many ways left to optimize lines to the rule, something would occur to him: "How you position some of the measurement points so you end up with a faster shape. Some of it was arcane. Some was rule related. Some was just for speed."

Andrews also learned a lot by sailing on the boats himself, which he considers critical.

"I race on a lot of the boats," he says. "I think it's important to know

LARRY MORAN

BRONNY DANIELS

Left—Allegiance, *built by Dencho Marine with epoxy resin, carbon inside skins, S-glass outside skins, and a foam core, was first in class and second overall at the 1984 SORC.* ***Above***—*The ULDB 70 (21m)* Alchemy *won the Cal Cup in 1992, demonstrating that there were alternatives to Bill Lee's hitherto dominating Santa Cruz 70.*

how the boats work. You're interacting with the crew, working on the same team as the crew. You never want it to be the designer against the crew. There are plenty of smart people in the world and if someone has some ideas to make things better, you want to be sure to incorporate them. As a designer, if you have ideas the crew hasn't considered, you can show them that they actually work. Owners have to listen to the crew, too."

In the late 1980s and the 1990s, the ULDB 70s raced under the IOR. The class association set upper and lower limits on displacement because a heavier boat has more righting moment going around buoys; plus, lighter is faster off the wind and most distance races on the West Coast are generally off the wind. Weather systems are driven by the Pacific High and systems that come down the Pacific Coast; they tend not to be driven by frontal systems. The class set up the season championship with a mix of buoys and offshore races. Plus, there was a limit of two ratings per year to prevent owners from switching keels.

The Cal Cup, run by the California Yacht Club (Marina del Rey), starting in 1985, was the de facto ULDB 70 buoys championship. In 1992, *Alchemy*, an Andrews ULDB 70, won despite having been launched by Dencho Marine just weeks earlier. Andrews says it was the first time a Bill Lee boat had been beaten in the Cal Cup. As noted above, Lee's boats were "shy" on sail area, which suited them to inshore buoy races, where the afternoon sea breeze comes in at 12–15 knots—plenty to push a bigger boat. Lee boats had dominated that series.

Andrews gave *Alchemy* an advantage over the Santa Cruz 70 by locating the transom corners a bit farther aft, as this was the point from which other measurements were taken, including the midsection, "where the boat wants to be the biggest or fastest." Another interesting difference resulted from the ULDB 70 Association's reverse-age allowance, which required newer boats to rate lower; Andrews gave *Alchemy* less sail area, but an extra half-foot (15cm) in length. "The fastest hull shape," he says, "has the maximum cross section area aft of where the Santa Cruz 70 is measured, and we did a better job of working with the rating on that."

Also around this time, development racing began to shift as IOR faded in other parts of the world and Transpac was about to raise its IOR 70 rating limit.

Under IOR, ULDB 70s rated at the traditional international limit of 70. Old IOR maxis like *Kialoa III, IV,* and *V* and *Boomerang* also rated 70 though they were up to 81′ (24.3m). Old ULDB 70s were actually 68′ (21m) long. For the Transpac, the ULDB was the fastest boat to get to Hawaii, and there was a big fleet with around 20 boats.

Then the International Measurement System (IMS) began to replace the IOR, and the maxi owners shifted to the faster ILC Maxi class. (The International Level Classes were created under IMS to group yachts for boat-for-boat racing in the same way the IOR had the Quarter Ton, Half Ton, One Ton, and Two Ton level rating classes. Other classes besides ILC Maxi were the ILC 30, ILC 40, etc.) Suddenly the ULDB 70 fleet was no longer the fastest, and owners had to make a

choice. Several clients asked Andrews what they could do to speed up their boats and whether it was worth doing. The result was changes to two commissions already under way at Dencho Marine: Hal Ward's *Cheval* and *Vicki*, for Vicki Lawrence, the actress and singer, and her husband.

In the fall of 1994, Transpac organizers changed the rating limit from IOR 70 to match an ILC Maxi, allowing Larry Ellison's bigger and heavier *Sayonara* to enter and attracting *Windquest* and the W60 *America's Challenge* to a Demonstration Division. Hal Ward said he wanted to be first to finish. Andrews advised that sail area could be added, but it would be better if he started over with a bigger boat. That didn't happen, so updates were made to his in-build ULDB 70. Thus, *Cheval* became the first of the so-called turbo sleds. She had a fractional rig 10′–12′ (3m–3.7m) taller than a regular sled, which put the spinnaker up 10′–12′ higher. And she was given a 1½′ (381mm) deeper bulb keel in place of the original fin. Andrews says, "Short story is *Cheval* was fast enough to get to Hawaii first. The backstay broke on the last jibe at Molokai Island, but they had enough lead to put up a jury rig and beat Larry Ellison and other maxis that were not ULDBs. That same race Roy E. Disney turbocharged a Santa Cruz 70, *Pyewacket*, but she was not as fast as *Cheval*."

That, says Andrews, was the start of the turbo sleds. *Cheval* and *Vicki* were out of same mold as *Victoria* and *Alchemy*, but the owners commissioned Andrews to design the laminate schedule and structure, wanting to step up to a full carbon/foam laminate for the '95 Transpac. Andrews says these were some of the first boats with roller-impregnated vacuum-bagged carbon skins, and foam cores, all post-cured. They are still active today.

The ULDB 70 *Magnitude* was built for the '97 Transpac with the same construction, and over the years went through several evolutions, racing in the Great Lakes and Caribbean tours. She was purchased by well-known yachtsman Philippe Kahn for the 2011 Transpac, for which Dencho did some updating. Since then it has become the latest *Pyewacket* for Roy P. Disney (Roy E. Disney's son). Andrews says, "The basic structures are in pretty good shape—the carbon epoxy/foam laminate has worked pretty well, though they've had a pretty hard life."

To more clearly explain turbocharging, Andrews says, "Turbocharging is taking a 68′ masthead rig ULDB 70 and adding more sail area and adding more righting moment with a deeper keel. Since they were developed for the IOR they had fin keels as opposed to bulb keels and a fair amount of internal ballast. So you had the ability to lower the CG [center of gravity]. The IOR has a CG factor in it that penalized you even if you were going downwind, because it's a single-number rating. So when you look at races like we have here, such as LA to Hawaii, you have a couple of hours of beating and then you start reaching and then spinnaker-reaching and then more than half the race you're broad-reaching with the spinnaker up. There's no reason to pay any stability penalty if you don't have to. IOR boats tend to get their stability from adequate width."

COURTESY ALAN ANDREWS YACHT DESIGN

This 6.8m (22.3') one-design day-racer is in development, with emphasis on match racing in "provided boat" regattas. The wide-open cockpit extends forward of the mast to facilitate handling of the masthead spinnakers.

Cruiser/Racers and the International Measurement System (IMS)

There comes a time in the life of many yachtsmen when the rigors and costs of campaigning a large boat, sometimes in different oceans, becomes too much. Age is another factor. They want a cruising boat for the family, but still want to go fast and have a good time. Not finding what they want in the marketplace, they call Andrews.

The first of these clients had been a partner in the *Details* MORC project. He'd had a North American 40 and had Andrews optimize it. In the late '80s he wanted a bigger performance cruiser in the 50′ (15.2m) range. He'd looked at a Santa Cruz 50 but felt there wasn't enough interior space for his two daughters and their friends.

Andrews: "So in '89 he commissioned us to design a new 50-footer named *Outta Bounds*. We pretty much ignored the IOR, no distortion to hull shape, stern, or midsection. Very clean hull shape. We gave her an aluminum rig and bulb keel. I thought he might race it, too. And he did, winning his division in the Newport to Ensenada Race. Then he entered the '89 Transpac. He actually enjoyed bringing the boat home from Hawaii! She was aimed more toward the IMS but mainly just a good sailboat." *Outta Bounds* drew interest from others seeking performance cruisers, spawning the slightly larger Andrews 56.

Another owner had an aluminum Two Tonner that was too heavy in the ends and couldn't be changed, so Andrews designed a new boat for him, trending toward the IMS. Rather than sell the old boat in a soft market, they fitted the deck gear, much of the rig, engine, and steering from it to the new hull, deck, keel, and rudder. This not only allowed the owner to keep his new inventory of sails, but

Kevlar boat would shorten the waterline compared to a carbon boat. Our VPP [velocity prediction program] comparisons showed the 'longer' carbon boat faster, but not enough to make up the rating difference.

"I also looked closely at hull shape. A lot of other IMS boats had hollow in the waterlines that in effect ended with a bump where the entry joined the midsection. We didn't do that. We felt we had a better shape—straight lines and no bump—for going through waves. And we looked at foretriangle aspect ratios. At that time IMS didn't yet give you credit for having less than a 150% genoa. So that affected the foretriangle aspect ratio; a high-aspect foretriangle results in less genoa overlap of the main and hence less backwind for your maximum sail area."

Growler was a prelude to a planned 1997–98 Whitbread campaign by owner Neil Barth. For the round-the-world crewed event six models were tested in the U.K. at the Wolfson Unit. Structures were developed consulting with Southern California structural engineers Buchanan and Newcomer. Hydryodynamicist David Egan contributed CFD analysis. *America's Challenge II* had very little tune-up sailing but an impressive first leg to Cape Town. Lack of funding prevented the boat from continuing the race.

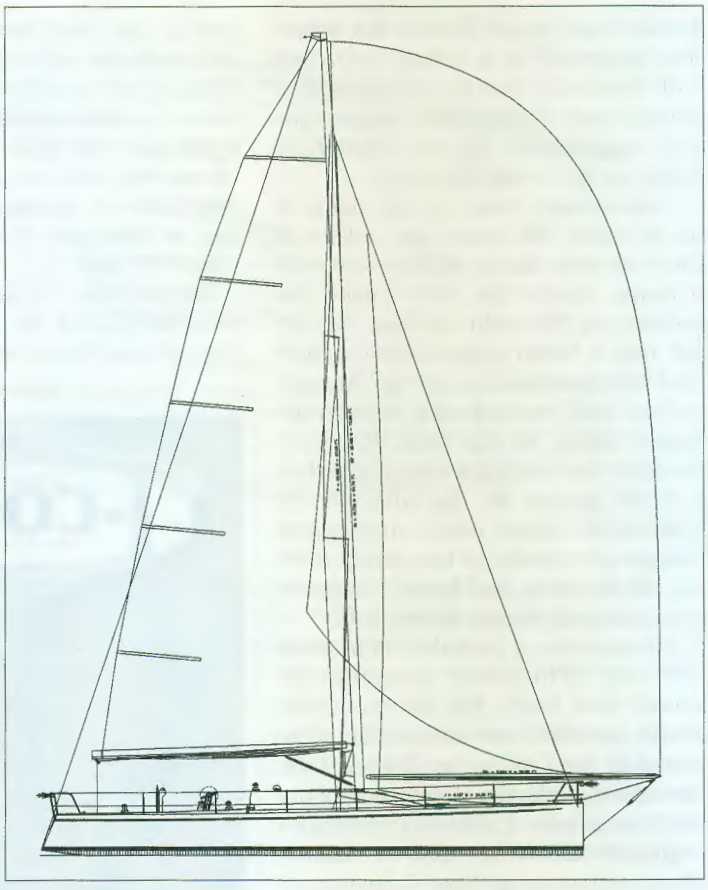
Birth of the TP52s

In the late 1990s, the way boats were rated started to change.

"Previously, if your ISP (spinnaker hoist) measurement went up, you were rated as if your jib was taller as well, as though the forestay and spinnaker halyard were in the same place," Andrews says. "In IOR and early IMS you had a 150% genoa. If greater, you got a hit. If less, you got no credit. Same thing with mainsail girth; you could not go over the limit, but there was no credit for less. When IMS came in, they started to figure out that since this was a VPP rule and they were rating boats' different performance characteristics on different points of sail, there was no reason they couldn't rate a masthead spinnaker separate from a fractional jib. In a similar manner, they could rate smaller LP jibs, which eventually led to today's non-overlapping, swept-spreader rig. Asymmetrical spinnakers were allowed because they could figure how to rate them based on wind tunnel tests—the performance improvement of an asymmetrical spinnaker versus a symmetrical spinnaker was significant. The rules had been freed up and we could do some new things, like masthead spinnakers on fractional rigs, as had been done on the Turbo 70s under IMS."

Locomotion is an Andrews 45 (13.7m) ULDB built by Westerly Marine and launched in December 1999. It was the first of what Andrews calls the "new technology boats." By this he means a new family of planing hull shapes with relatively flat bottoms, which are a significant departure from the typical IOR V-shaped hullform with the bottom cut off flat. It had a D/L^3 of 80, a metal fin, and lead torpedo keel. The fin was cast of ductile iron with a flange that bolted flush into a laminated rebate in the hull. The hull skins were carbon on the inside and a

DOUG DEAVER



COURTESY ALAN ANDREWS YACHT DESIGN

Left—Locomotion *is a 45′ (13.7m) ULDB, with a D/L of 80, metal fin, torpedo keel, and carbon/E-glass/Kevlar vacuum-bagged hull that circuitously led to development of the TP52 class* ***(above)*** *for Los Angeles to Hawaii Transpacs and grand prix buoy racing.*

combination of E-glass and Kevlar on the outside, vacuum bagged. The rig was all carbon from Hall Spars.

The owner was paralyzed from the waist down, so Andrews developed a seat that allowed the owner to adjust the heel angle of the seat so he could steer or trim the main. The seat was on two sets of tracks so he could pull himself to windward and leeward as well as fore and aft. The side decks were narrow in that area so he could get out to weather.

Most of the racing was Performance Handicap Racing Fleet (PHRF). Andrews says, "We made it as fast as we could without doing anything stupid under PHRF. So we started off with a really long spinnaker pole, because PHRF rated you on how fast they thought you were rather than what some rating rule said." In her first season she finished first in PHRF B and third overall in the 1,000-mile San Diego to Puerto Vallarta Race. She didn't slow down, finishing first in the 2011 Newport to Cabo San Lucas Race and numerous others over an 11-year period.

In a somewhat circuitous way, *Locomotion* eventually led to development of the TP52 class. Two owners—one who'd just sold a J/120, and another who'd had Andrews turbocharge his Andrews ULDB 70—each wanted something like the 45′ *Locomotion*, but around 50′, and already turbocharged so they didn't have to come back to Andrews later to "speed them up."

They were motivated in part by Transpac's announcement that in an effort to promote smaller, less expensive yachts, they would award a trophy for the fastest 50-footer. A committee was formed, with Andrews and Bill Lee among its members. The size grew to 52′ (15.8m) and the class was established as TP52 (TP for Transpac). Andrews received the first two orders—*Victoria 5* and *Jaybird III*.

The old deck/new hull trick worked again for a client who owned an old Farr IOR 50, which wasn't going to fetch much on the used-boat market. Dennis Choate had the TP52 mold and built him a new hull.

"We did some stuff with the beam," Andrews says, "moved it in and out with the mold. Gave it a new keel, and couldn't use the original rudder either. Basically, we put the old IOR deck on a new TP52 hull that was longer and wider than what he had. We kept the deck hardware and arrangement he was familiar with—not only the winches and blocks, but it saved work reinforcing the deck where the hardware was mounted. Backing plates, bearing plates, tubes that go through, and all that. Putting a new hull under a boat doesn't work for many people but can work in some situations. It works for people who don't want to be in the position of owning two boats. And it works for people where the parts of their boat (deck hardware, rig, sails) are worth something—if they've done a good job of maintaining their deck gear and sail inventory."

SHARON GREEN/UNLIMITEDSAILING.COM

The now 63′ (19.2m) water-ballasted ULDB Medicine Man *was first to finish in the 1997 Transpac, breaking a 20-year-old elapsed time record, and was first in the Unlimited Division in 2009.*

One of Andrews's fastest overall designs is another *Alchemy*, this one a 77-footer (23m) with water ballast and a lifting keel due to depth restrictions in Santa Barbara harbor. She has a masthead spinnaker on a fractional rig, finishing first in both 2003 Mackinac races, the 2004 Ensenada, and 2008 and 2009 Swiftsure races, and setting a course record in the San Diego to Manzanillo Race. She was built by Dencho Marine, with the laminate engineered by High Modulus.

The second *Magnitude*, a maxi named *Magnitude 80*, was a no-holds-barred effort to design and build the fastest possible boat with 12.2′ (3.7m) draft for harbor access. A canting keel was chosen, which Andrews says can make for a lighter boat than one with water ballast, for the required stability.

JOHN SPOONER

The canting-keel maxi racer Magnitude 80, launched in 2004, set course records in long-distance races, including those from Southern California to Cabo San Lucas and Puerto Vallarta, and Mexico and Los Angeles to Tahiti.

Andrews's design team included High Modulus again for the laminates, engineer Dirk Kramers on the canting keel, and David Egan again contributed CFD. Hall Spars made the rig, and the local North Sails loft, the sails.

"The team iterated back and forth," Andrews says. "I ended up being the arbitrator. Hydrodynamicists want it as small as possible; the structures guy wants it strong and not flexible. Our office was the lead designer and integrator of everything."

She launched in February 2004 and the following year set a new course record in the Newport to Cabo San Lucas Race as well as LA–Tahiti and a number of others over the next years.

Tending to the Classics

The iconic *Ragtime*, built in 1965, is a near-legend on the West Coast, with records set in many races; for years she was considered the seminal Transpac yacht. Andrews developed several keels for her over the years as new owners came and went, as well as a new mast, maststep, keel floors, ring frames, and cockpit revisions.

Windward Passage, the breakthrough maxi designed by Alan Gurney (see "Passage Maker," PBB No. 151), was built on the beach in the Bahamas in 1967. Andrews oversaw a retrofit of that classic with a carbon rig, new rudder, and welded steel tank fin with torpedo bulb.

Andrews has also done a smattering of odd jobs, including a semi-submersible reef viewer for tourists on Catalina Island, built by Willard Marine (see "Willard Marine: Turn the Page," PBB No. 153), a 35′ powercat tender, and a 37′ (11.3m) picnic-style lobsterboat derivative for an owner in Brazil, but all-out racing yachts remain his specialty and his passion. Why stray, when you're damn good at it, your great love is sailing, and your customers expect you to sail with them? PBB

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