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THE LONG-DISTANCE BICYCLE

A Unique Design Is Forged from Marathon Experience

By Chris Kostman

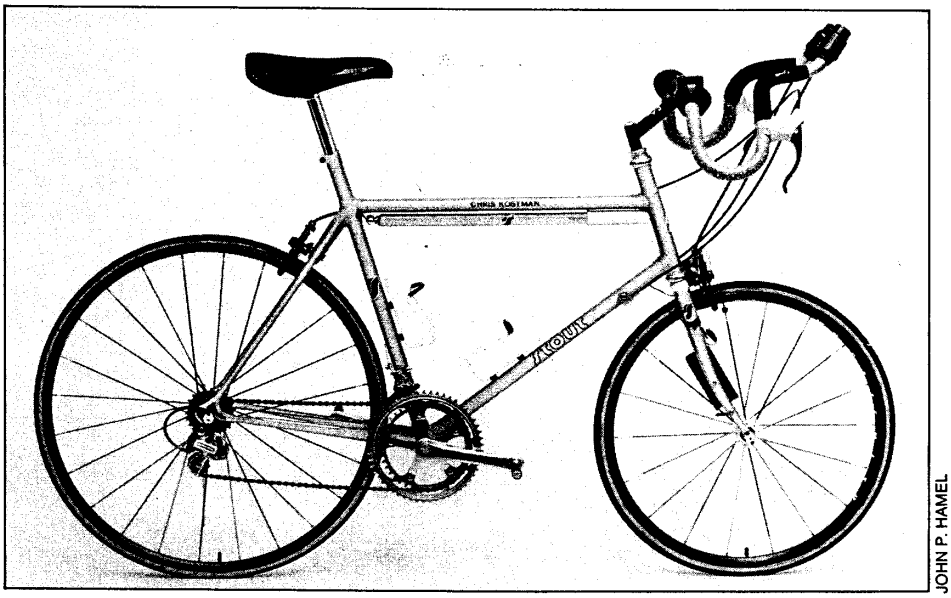
For decades there were two types of road bicycles: tourers and racers. The sport/tourer later evolved as a hybrid. Partially as a result, the bicycle industry began experiencing a resurgence that continues today. Manufacturers realized that a new name and decals, plus slight design modifications, could stimulate sales. Hence, the subsequent introduction of criterium and triathlon bicycles.

Based on the incredible sales of these models in the past five years, the cycling public has yet to realize that these bikes, regardless of cosmetics, are essentially the same. Sure, there may be a one-degree difference in the head angle or fewer spokes in the wheels. But for more than 90% of all cyclists, any of these bikes could be used in events ranging from criteriums to triathlons to double centuries. Obviously the time has come to build a bicycle that uniquely suits its intended purpose and works harmoniously with the rider.

Last year, while competing in the Race Across America (RAAM), I decided to develop the optimal marathon bicycle—a bike that would be tough enough to survive 3,100 miles of American roads, light enough to climb the Rockies, stable enough to descend from mountain passes at more than 50 mph, aerodynamic enough to cut through the headwinds of the Great Plains, and comfortable enough not to annihilate its rider after days of brutal cross-country time trialing.

While racing, I mentally sketched this unique bike. As I got an idea, I'd radio it to my support team to jot down. By the end of RAAM we had much of the design work accomplished. Later, I visited custom framebuilder Ron Stout in Salt Lake City to bring the idea to fruition. We spent many hours discussing the design, manufacture, handling, and ride characteristics. We also used a special adjustable bike for fitting. Several cycling industry figures were then consulted and provided valuable input, including Eric Hjertberg of Wheelsmith, Boone Lennon of Scott USA, and Steven Hed of Hed Design.

Aerodynamics, ergonomics, weight, stability, handling, center of gravity, ease of maintenance, comfort, durability, stiffness, biomechanics, and overall efficiency were considered in the design of this bike. In addition, because ultra-marathon cycling is a peculiarly American sport, we wanted to use exclusively American-made componentry where possible to further this identification, stimulate the domestic cycling component industry, and encourage competition that ultimately would benefit cycling worldwide.



JOHN P. HAMEL

The Ultra Stout is now available on a custom-fit basis for about $2,995, or $1,395 for the frameset only. What follows is some of the thinking that went into the design and implementation of this bike in the hope of stimulating interest in the unique demands of long-distance cycling.

Building the Frame

The frame of my Ultra Stout was constructed of heat-treated Tange Prestige tubing with investment cast lugs. It was silver brazed at the lugs, brass brazed at the dropouts, and built entirely with a jig for proper alignment.

To stiffen the frame, decrease the bike's frontal area, and lower the center of gravity, a 24-inch front wheel was used. To make the bike fit like a standard road bike, the seat and head tubes were extended past the top tube and strengthened with reinforcing collars. This also permitted a shorter than normal main triangle for its frame sizes. Combined with Stout's R-1 wishbone seatstay, this stiffened the frame. These measures were coupled with shorter, hence stiffer, fork blades and a lower bottom bracket. Stout chose angles and dimensions to offset the loss of wheel inertia that occurs with a small front wheel.

The frame was finished in two-color-fade DuPont Imron. Braze-ons were included for shifters, front derailleur, chain hanger, headlamp, and water bottle mounts. Fork bottle mounts were added for long unsupported training rides or for the lighting system battery pack. There were internal cable guides for brake, derailleur, and computer wires.

Cockpit and Control Center

The Scott U.S.A. DH handlebar was used because of its aerodynamics, ergonomics, and efficiency. This bar and its hands-forward, elbows-together position was developed by Boone Lennon, former U.S. national ski coach and elite-level, veteran-class USCF racer. Besides providing six standard positions, the bar brings the rider's arms together in front, effectively closing off the large air pocket formed by a standard drop or time trial bar. The aim is not to "get low," but "get narrow."

This concept, developed by Lennon in '83, is based on the position used by downhill ski racers. My speed increases by an average of 1 to 1.5 mph by using this position. "Aerodynamically, the rider is the greatest deficit, not the bike," says Lennon. The DH bar connects to the frame with a custom Salsa Promoto stem, drilled for the computer wires.

Another innovation was SRAM Corporation's Grip Shifters. Designed to mount as bar-end shifters, they feature a rotating knob, not unlike a motorcycle throttle, to click between the precisely spaced index detents. On the DH bar they allow shifting without changing from the optimal aerodynamic riding position.

With this system, shifting is easier, hence more frequent and efficient. This contributes to a higher average speed, especially in rolling terrain where near constant shifting is necessary to maintain a steady cadence. Instead of coasting downhill, you can effortlessly shift to a higher gear to take advantage of the terrain. Also, at high speed or while sprinting, you can shift without taking your hands off the bar.

Other components included a pair of easily modulated Scott Superbrakes and an Avocet GelFlex saddle mounted atop an American Classic seatpost.

The Drivetrain

Currently the crankset on the Ultra Stout is a Shimano Dura-Ace with round 42/53 chainrings and 170-mm crankarms. This will be replaced with a new hollow chrome-moly crank from Cook Brothers Racing once it's available.

A drivetrain option will be a Browning custom electronic front shifting system. This is a 2-speed version of the 3-speed model available for mountain bikes. Waterproof and maintenance free, the Browning allows facile push-button shifting under load. Once available, this system will replace the Dura-Ace front derailleur and left Grip Shifter shown in the photo.

The rear derailleur is the 7-speed indexed Shimano Dura-Ace. Indexing is a plus for energy-draining marathons, making shifting virtually effortless and mindless. The system is coupled with the Sedisport chain and one of two Dura-Ace freewheels: a 12-23T model for hilly terrain, and a 12-21T version for the flats. The Ultra Stout has Aerolite pedals. Weighing just 60 grams apiece with steel spindles and 33 with titanium, Aerolites require a mere snap of the foot to enter and a twist to exit, yet won't accidentally release. The Aerolite is not only the lightest (hence most fatigue-reducing) pedal available, but also the simplest to use. And, eliminating toe clips increases foot comfort.

Wheels

Wheels are vitally important in terms of aerodynamics, acceleration, comfort, and handling. Additionally, the spokes have a greater combined frontal area than any other component, including the frame. Decreasing their number quickly increases the bicycle's aerodynamics.

The Ultra Stout has a 24-inch front wheel, which is as strong as a standard 27-inch model and uses shorter (hence stronger) spokes. This in turn allows the use of fewer spokes, with 18 being optimal. Additionally, according to Hjertberg, about half of the aerodynamic improvement in the bike comes from the front wheel. It's 10% smaller, hence more aerodynamic than a 700C wheel. The standard-size rear wheel is laced with 24 spokes. The bladed type is used throughout to further increase aerodynamics.

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