

EXOTIC vs. TRADITIONAL BIKE DESIGNS: WHO'S WINNING?

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WPS 07199

WORLD'S LARGEST ALL-TERRAIN BICYCLE MAGAZINE

\$2.95
CANADA \$3.90
UK £1.90

OCTOBER 1990

ISSN 0898-8442
PRINTED IN THE U.S.A.

FIRST TEST:
**MANTIS
FLYING V**



THE WAY ALL
MOUNTAIN BIKES WILL
LOOK IN THE FUTURE?

SPECIAL REPORT:
WHY THE SIERRA CLUB HATES MTN. BIKES!
CYCLING SAFARI: ULTIMATE AFRICAN ADVENTURE!
INSIDE CYCLING'S SMART NEW ACCESSORIES!

ISSN 0898-8442



MANTIS FLYING V

Never a dull moment at Mantis



It's important to note that Mantis designer Richard Cunningham is not one of the original Northern California mountain bike icons. He isn't one of the ten guys who claim to have invented the mountain bike. If he were, he wouldn't be breaking with tradition to build a series of bikes so radical that they have pushed off-road design further than anyone could imagine. Need proof? It was Mantis that pushed top

Riding room: The lack of tubes in the front triangle eliminates the need to build a bike with the traditional triangle shape. With the aluminum monocoque, the Flying V has more standover height and top tube clearance than any other hardcore mountain bike.

tubes out beyond the stubby road bike length they were a short (no pun intended) five years ago. It was Mantis that developed the

phenomenally successful XCR composite that combined an aluminum front triangle with bolt-on steel stays (a concept that now appears on four popular off-road bikes). It was Mantis' Richard Cunningham who popularized elevated chainstays by designing the Nishiki Alien in 1985. It was Cunningham's engineering that produced the unique box-section aluminum tubing for the 1990 Nishiki Alien ACX main frame. It was Mantis that built the Maserati birdcage-style X-frame that used small-diameter steel tubing in such a unique way that frame strength skyrocketed while weight dropped.

Now Mantis is building monocoque mountain bike frames!

WHAT IS A MONOCOQUE?

Richard Cunningham has a background in motorcycles (he worked for Bassani Engineering building high-performance exhaust systems), automobiles (he hand-formed aluminum bodywork for IMSA sports cars and vintage restorations), airplanes (his whole family is fascinated with flying and has built and designed ultralights) and, of course, he is a frame builder. The natural blending of motorcycles, airplanes, automobiles and bicycles gives Richard a fresh vision on the construction of vehicles—and monocoque construction is a natural progression.

In technical terms, a monocoque is a stressed skin design. In simple terms, the skin or shell is the frame. At one time airplanes used to have wood or steel frames over which a skin was attached. No more! Modern aircraft are monocoques. The skin is constructed in such a way that the plane needs no tubing. Formula One race cars are monocoque constructions. They use carbon fiber tubs and alloy boxes to attach the motor and suspension components to. Current Delta-Box motorcycle design is pushing the monocoque envelope. An L-shaped aluminum box serves the same purpose on Wayne Rainey's V-4 Yamaha as the carbon fiber tub of Alain Prost's Ferrari. The next logical jump? Bicycles.

INSIDE THE MANTIS FLYING VEE

There is nothing inside the Mantis Flying V. It's hollow. Mantis forms the frame in halves out of thin-walled aluminum. A head tube and seat tube are slipped into place and the halves are Hell-arc'd together. After heat-treating, the complete monocoque frame weighs under 3.75 pounds. That's light. So light that the complete Flying-V tips the *MBA* scales at 23.5 pounds with standard-issue Shimano components. Mantis' NORBA Expert rider Pat Nolte used the

FLYING V

prototype Flying V to win the Michigan round of the 1990 NORBA Nationals, and Pat's race bike weighs under 23 pounds.

Hardcore mountain bikers can't resist ogling the Flying V. They stomp on the hollow aluminum body, twang the guitar-style control cables and marvel at the unique construction. Here are the most commonly banttered facts and foibles of the Flying V.

Weight: The light weight of the Mantis frame comes from the fact that the stressed skin can be thinner than the wall thicknesses of an oversize aluminum tube. Pat Nolte's race bike weighs less because it uses an ultra-thin-wall 6061 sheet.

Rigidity: With a monocoque design you don't have to stick with straight lines, as with tubing. Mantis tries to create a beam that allows them to put the stiffness where they want it. A close look at the monocoque frame will reveal that the shape varies to enhance frame rigidity. The head tube is fully enclosed and, thus, better supported than one that has two tubes welded to it. Bottom bracket flex is almost non-existent thanks to the shape and profile of the monocoque's body. The complete chassis can be fine-tuned during production by changing skin thickness, shape profile or hollow section widths. It is a very rigid frame.

Dialed in: The 70-degree head angle is mated to a 73-degree seat tube angle to produce a comfortable, stable and agile machine in all off-road conditions. The monocoque main frame is very stiff with minimal bottom-bracket flex. ▶



Construction site: An elevated chromoly rear sub-section bolts to the aluminum monocoque main triangle to produce the most unique mix of design elements in the past five years. The only aluminum tubes used in the front triangle frame are in the seat, head and bottom bracket.



Power pocket: Armed with standard-issue Shimano Deore XT components, the Mantis Flying V monocoque tips the scales at 23.5 lbs. If the monocoque was made out of the same thickness aluminum as a Boeing 747, the V could weigh 22 lbs.



Guitar bike: With all the control cables top-driven, the Mantis' hollow aluminum construction gives it the look of a musical instrument. The zero-rise stem is an essential design element on all small frames.



Model: Flying V
Manufacturer: Merits
 350 E. Orangeflora #27,
 Placenta, CA 90870
Size available: 15", 18",
 20", 21"
Weight: 23.5 lbs.

Finishes available: Inver
 (custom paint)
Suggested retail price:
 \$1050 (frame set only)
COMPONENTS
Front derailleur: Shimano
 Deore XT

Rear derailleur: Shimano
 Deore XT
Front brake: Grafton can-
 dlevers
Rear brake: Grafton can-
 dlevers
Crank: Shimano Deore
 XT (170mm) 24-, 35-

46 tooth chainrings
Freehub: Shimano
 Deore XT Hyperglide
 (12-28)
FRAME

Tubing: 6061 monocoque
 aluminum mainframe with

double tapered chromoly
 rear sub-section
Head angle: 73°
Seat angle: 73°
Top tube length: 21"
Chainstay length: 16"
Brake-ons: One water bot-
 tlie without eyelets

FLYING V

Absorption: Right off the bat, we need to clear the air: large-diameter aluminum-tubed bikes are not absorptive. The fat tubes resist flexing and thus don't give. A Vitus or Alan road bike is absorptive because it uses one-inch alloy tubes that flex and bow, but two-inch mountain bike tubes (whether they are steel or aluminum) don't bend under pressure. So why does everyone talk about the wonderful, forgiving ride of aluminum bikes? Because aluminum has the ability to deaden the effects of sharp blows, not transmit them with the same harshness as steel, riders confuse the dead feeling for flex. Take our word for it—the ride is different, but it isn't softer.

Sizing: If you are small, the Mantis Flying V is the cat's meow. Pat Nolte is the smallest rider on the NORBA circuit and, prior to getting her prototype V, she was forced to race bikes with 24-inch wheels. The Flying V has an awesomely low 25.5-inch standover height (a normal bike is closer to 31 inches).

Our test bike was a 15-inch model. Mantis Flying Vs come in eight frame sizes, but the sizing is more like ordering a shirt than a bike frame because of the monocoque's unique sizing capabilities. The eight sizes are comprised of 15-, 18-, 20- and 22-inch models, with each frame size available in long or short versions. It sounds confusing,

but it's very simple. Small riders would ride the 15-inch frame, but if they had long torsos or were in between a 15 and 18 they could opt for the 15 long. The 15 long is more stretched-out than the 15 short. That is one of the benefits of stressed skin construction—the chassis can be stretched by trimming the monocoque either longer or shorter.

Durability: Every techno-weenie in the world has his slide rule out trying to figure whether a monocoque aluminum frame will last longer than a tube aluminum frame. We wish we had an answer, but the whole concept is new. During our testing the chassis held up perfectly and Pat Nolte's lighter, and thus more fragile, prototype has endured a full season of NORBA racing. From a theoretical standpoint, the fatigue life of the Flying V should be considerably longer than a tube frame aluminum bike. After all, the monocoque Boeing 747s, built with .040" walls, have had a fatigue life well in excess of 20 years.

Water bottles: Since we were testing a 15 short, the frame was so small that only one water bottle could fit, but that is a problem with all 15-inch frames.

Price: Mantis doesn't make complete bicycles. They only make three off-road frames, XCR, X-Frame and the Flying V. At \$1150 for the Flying V frame and fork, a built-up Mantis will easily exceed \$2000—if you can get one! Mantis doesn't make very many bikes in a year, and ownership of one of the few makes you one of the proud.

Geometry: Mantis geometry is considered

by many riders to be the ultimate combination for light steering, high-speed stability and rough-terrain quickness. The Flying V has a 70-degree head angle, 73-degree seat angle, ultra-short 16-inch elevated chainstays and straight blade forks with 1.6 inches of offset. Our 15-inch frame had a 21-inch top tube and zero rise stem.

Handling: No wiggle, no twitch, no shudder, no wag! It's fun, quick and spot-on. The Flying V goes where you point it and does it with absolutely no hint of bottom bracket flex. The stiff monocoque frame helps the V gobble up rough ground and high-speed descents, while the short 16-inch chainstays make it climb like an escalator.

Most test riders raved about the diminutive nature of the frame. The low standover height, elevated stays and well-balanced geometry produced a bike that almost disappeared under the rider—kind of like blending a BMXer, downhiller and hillclimber into one tight and secure package.

WHAT WE REALLY THINK

MBA test riders are a fickle crew. They ride the wildest, weirdest and most expensive bikes in the world. But don't let the quiver of exotica fool you. When we set out to ride for fun, most of the cutting-edge, quasar bikes are back home in the garage. Wild and weird are fun to play on, but out in the boondocks we demand confidence in a design. The Mantis Flying V is weird and wild, but it doesn't spend any time in the garage. It's a hot design that won't gather dust or rust around the MBA wrecking crew! □

