

Another Winner From The Mind Of Chris Cocalis

Pivot Mach 4 R. Cunningham

Chris Cocalis designed many of MBA's all-time favorite bikes—most noteworthy are the long-travel Titus Moto Lite trailbike and the cross-country competition-ready Racer X. Chris has since moved on to found another bike brand called Pivot, and the four-inch-travel Mach 4 is the first of Pivot's lineup to hit the bike shops. The Mach 4 has some family resemblance, but only in the fact that its profile is slim and devoid of flash-in-the-pan techno touches that many contemporary bike makers are fooling the public with.

Where's the carbon? Only in the upper link, where Chris employs a high-pressure molding process that produces a lighter, stronger-than-aluminum part. The rest of the Mach 4 is an integrated looking welded-aluminum chassis that harbors some of the most interesting design features that we have come across in quite a while.

WHAT MAKES THE MACH 4 SPECIAL?

Starting at the head tube, the Mach 4 frame uses a zero-stack head-set system that allows the front of the frame to sit about a half-inch lower without compromising strength. Zero-stack differs from an integrated headset in that the bearings still ride inside a machined cup that is pressed into the frame. Integrated bearings press directly into the frame and often have fit-up issues. The zero-stack head tube is larger diameter, which makes room for the Mach 4's oversized, triple-



Well engineered: The Mach 4's internal bottom bracket system allows the suspension's lower link to be well supported. The pivot and junctions are cold forged.



butted aluminum tubes. The thickness of the pipes varies between frame sizes so that any sized rider will feel the same magic ride qualities. The curved downtube facilitates taller fork crowns and remote lockout devices, and a tube-gusset at the seat tube/top tube junction helps reduce the bike's stand-over clearance to a useful, 29.5 inches (medium-sized frame).

Down low, the Mach 4 has a light-weight, cold-forged bottom bracket housing that captures the lower swing-link pivot and forms the bolt-on front derailleur mount. Two aluminum forgings are welded together to form the hollow part. More interesting is the threadless, ultra-wide, 92-millimeter bottom-bracket housing. Shimano now makes a press-in version of its XTR and XT bottom brackets that are premanufactured to fit directly into the shell without threads. The advantage is that the frame extends outward to support the bearings instead of a pair of screw-in external cups. (Shimano warrants the double-sealed bottom bracket for three years.) Less noticeable is that the lower linkage is offset to the left to widen the stance of the lower link pivot and therefore stiffen the swingarm where it needs it most. The downtube water bottle mount is offset to the right to compensate for the asymmetrical pivot location.

DW-LINK SUSPENSION

Much has been written about Dave Weagle's dw-link suspension, so we won't go into the nitty gritty details except to state that the dual-link swingarm pivot is configured to keep the rear suspension from compressing as the rider rocks backwards with each pedal stroke. Weagle calls this "anti-squat," and Chris Cocalis fine tuned the dw-link geometry to eliminate the board-stiff feel that excessive anti-squat imparts to the suspension, without sacrificing the system's lively, firm-feeling pedaling action. Superior pedaling action is only one-third of the Mach 4's suspension goal. Chris tested numerous linkage configurations before he found the right combination that was smooth over a wide range of speed and trail conditions yet remained uncoupled under braking.

Physically, the Mach 4's suspension is robustly built with overlapping gussets in the lower swingarm area and a massive replaceable derailleur hanger that should stand up to any impact the derailleur can handle. The swingarm is triangulated *a la* Santa Cruz Blur, with a single strut on the left side of the assembly. The upper link is a beautiful molded-carbon-fiber piece, while the beefy lower link is red-anodized aluminum. To insure longevity and lateral stiffness, there are a pair of sealed ball bearings at all four corners of the lower link. The suspension drives a custom-valved Fox RP23 shock that uses very little low-speed compression damping and, due to the effectiveness of the dw-link, requires little or no ProPedal anti-bob action. As a finishing touch, all the suspension hardware is custom made and red-anodized. Sweet!



SOME FACTS YOU SHOULD KNOW

Pivot offers the Mach 4 in six sizes to fit riders from four-feet, ten inches to six-feet, four—and in a number of build kits that allow customers to tune the Mach 4 to their budgets and riding style. Colors are blue or black anodized with white or black powder-coat paint.

THE SHIMANO CONNECTION

Chris Cocalis does double duty as a Shimano test rider and thus has access at the highest level, so his letters get special attention when they go into the Shimano suggestion box. Our test bike was outfitted with an '08 XTR drivetrain, including the new positive-action trigger shifters and the aforementioned second-generation bolt-on front derailleur and threadless bottom bracket cartridge. Being involved with the design process helps, as Chris was able to design his frame around the two components to eliminate bottom bracket spacers and achieve just the right chain line and derailleur/crankset alignment.

RIDING THE MACH 4

Our Pivot's "Ultralight" component kit uses a Fox 32F 100RLC fork, and we were cautioned not to over pressurize the fork and shock, as the Mach 4's suspension design and frame geometry are optimized for this purpose. We complied, making sure to set the sag correctly (25-percent) and backing out the rebound and low-speed compression settings to the minimum. The resulting ride is far smoother than most cross-country racers (the Mach 4's target audience) are used

Pivot Mach 4

to. In fact, as the testing progressed, we felt like the Mach 4 had an extra inch of suspension travel in reserve—especially at big-ring speeds where the Mach 4 shed its racer-boy costume and simply ripped up the rutted and jumpy downhill sections of our test loop.

We attribute some of this to the fact that we could run the rear suspension soft enough to take some of the load off the fork. Most cross-country riders use a lot of pressure in the shock to maximize pedaling firmness, and this overdrives the fork, forcing it to ride low in its travel. The Mach 4 suspension rides level, which boosts its big-bump performance and keeps the steering geometry from becoming steep and unwieldy when entering corners or descending steeply.

Like all of Chris' designs, the geometry is steeper than most trailbikes'. Its 70.8-degree head angle and 73-degree seat angle are the stuff of classic racing designs, but there is no sense that the high-speed stability of the Mach 4 is compromised. Instead, the Mach 4 feels lively under power and at singletrack speeds, as a racer should, yet manages to hold a steady line when the time comes to bust out the big chainring. The Pivot jumps easily and lands without a wiggle from its rigid rear end.

The same goes for cornering performance. In turns, the Mach 4 was nimble at low speed, like when negotiating switchbacks or picking through boulders, and still managed to feel very secure when bombing descents. Minor slips and slides required little or no corrective action, and bigger events could be handled with a flick of the handlebar or an intuitive weight shift.

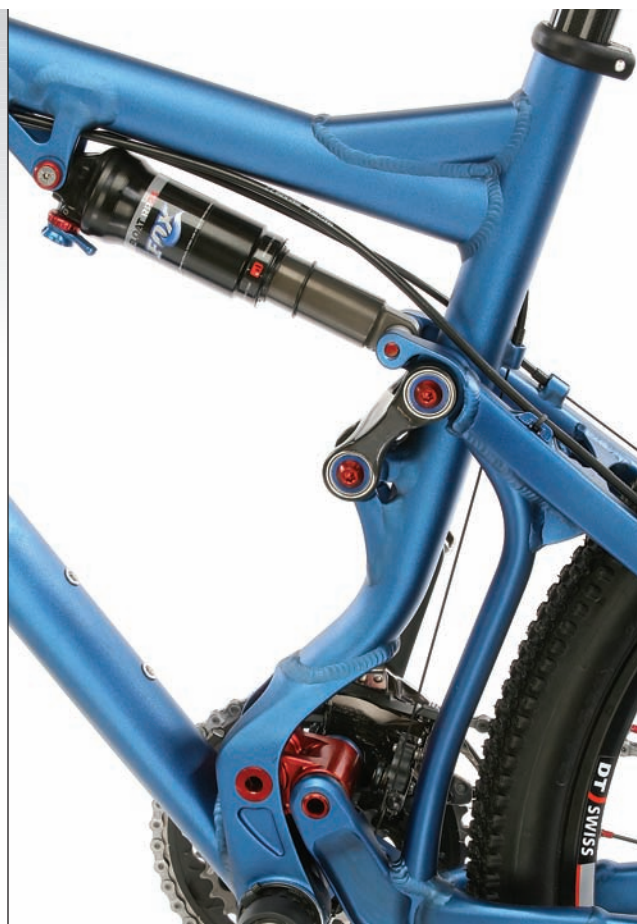
Pedaling and climbing were quite easy aboard the 25.1-pound dual-suspension racer. For one thing, the frame feels laterally rigid to a degree that will impress even the strongest riders. Acceleration feels very efficient and, with the fork and shock activated, there is no sense that the Mach 4's suspension is sucking up leg power. Jump out of the saddle and the Pivot squirts forward with hardtail-like acceleration. In the saddle, the Mach 4 accelerates more smoothly. The fact that the chassis can suck up the terrain while delivering efficient pedal action surprised first-time riders who, without knowing it, frequently climbed in the middle chainring where formerly they used the granny.

STICKY STUFF

Living in Southern California does not often give us an opportunity to get test bikes muddy, but during our recent spate of rain we discovered that the large amount of real estate that Shimano's new front derailleur uses acts as a muck collection shelf that directs wads of the gooey stuff into the Pivot's (thankfully double-sealed) lower link. There was room enough for the mud above the Mach 4's Kenda Small Block Eight tire, but like all dual-link rear-suspension designs, not much. A larger, more aggressive tire would have loaded up and dragged in similar conditions.

WHO NEEDS THIS BIKE?

The long-travel trend calls for a five-inch suspension design that climbs and accelerates like a short-travel machine. Pivot's Mach 4 solves that equation in reverse: it gives its rider all the benefits of a shorter-stroke cross-country racer, like sharp acceleration and a dizzying rate of climb; it hits the scales near 25 pounds; and it delivers the downhill handling of a longer-stroke trailbike. The Mach 4 is an exemplary four-inch-travel trailbike that perfectly suits racers who don't have the desire (or perhaps the cash) to own one bike dedicated for racing and another for trail riding and training. The Mach 4 can burn laps with any cross-country racer and still rip it up on a technical trail ride. We like it. □



Not a Horst Link: Pivot designer Chris Cocalis was previously known for his mastery of the Horst-Link rear suspension. He switched to the four-bar, dual-link system to achieve more lateral rigidity in the frame and because it gave him more room to experiment with suspension rates.

PIVOT MACH 4

Price	\$5695 (\$1895 frame and shock)
Country of origin	Taiwan
Weight	25.1 pounds
Hotline	(480) 467-2920
Frame tested	18.5"
Bottom bracket height	12.8"
Chainstay length	16.75"
Top tube length	23.25"
Headtube angle	70.8°
Seattube angle	73°
Standover height	29.5"
Wheelbase	42.5"
Suspension travel	(front) 3.9"
Suspension travel	(rear) 4"
Frame material	Aluminum
Fork	Fox 32F 100RLC
Shock	Fox RP23
Rims	DT Swiss XR 4.2D
Tires	Kenda Nevegal (f), Small Block Eight
Hub	DT Swiss 240s
Brakes	Magura Marta SL
Brake levers	Magura Marta SL Carbon
Crankset	Shimano XTR
Shifters	Shimano XTR trigger
Front derailleur	Shimano XTR
Rear derailleur	Shimano XTR Shadow
Chainrings	Shimano XTR (44/32/22)
Cassette	Shimano XTR (11-34)
Pedals	None (weighed with Shimano 959)