DUAL RESPONSE

Double The Pleasure, Double The Fun!

It seems like no matter how well Team Diamond Back racers do, or what kind of bikes Diamond Back comes out with, the public's perception of Diamond Back over the past few years is that they're kind of middle of the road. That's ironic for a company which had one of the first *real* factory BMX teams, and was one of the first companies to come out with a true mountain bike back in the early '80s. The fact is, Diamond Back is one of the winningest bicycles in both BMX and mountain biking.

Even though DB's product managers have put out some exceptional bikes over the past few years, they've also become slaves to the inevitable pressures of volume sales. And even though Diamond Back has posted the numbers, management felt that their racing image has become somewhat diluted over the last few years. If their new DBR (Diamond Back Racing) program doesn't bring renewed focus to their racing image, we don't know what will.

R&D

Factory team riders have been racing for the last two seasons, somewhat covertly, on titanium bikes designed by Diamond Back engineers and built by Sandvik, one of the industry's biggest titanium frame fabricators. For 1993, Diamond Back offers what previously only team riders could get: a full zoot titanium race bike. But DBR has gone one better, offering two versions of their Axis TT, one with Shimano XTR and pretty much top-notch accessories, and the other with more affordable Shimano LX and only slightly downgraded parts. But the true centerpiece of DBR's commitment to racing is the *Dual Response,* a dual suspension machine so sophisticated you'd think it came from a motorcycle company.

WARP SPEED TECHNOLOGY

We'll let you in on a little secret. Some of the technology that goes into the Dual Response *does* come from a motorcycle company, Verlicchi to be exact. If that name sounds familiar, it should. Only a couple of months ago we told you about Verlicchi's involvement with the Iron Horse Works FS. The inside scoop is that Marzocchi, needing a frame to test their rear shock on, solicited Verlicchi to design the frame. What they came out with was the Iron Horse you see today. But Diamond Back wasn't quite content with that design and set out to come up with their own.

Diamond Back is emphatic that the only thing Verlicchi does is weld up the frames. But hey, if their work is good enough for Grand Prix racing motorcycles, it's good enough for us. With the help of computer-aided design and mechanics, as well as over a year's worth of racing input from riders such as BMX champion Harry Leary and motocross champion Johnny O'Mara, DBR feels very secure that their Dual Response is ready for the public. While there are several new designs that are "on the market," this is one of the few that has the amount of testing and refining that makes us confident enough to call it a real bike.

TECHNICAL DATA

There's a lot to the Dual Response, so let's just dive right in. DBR starts with a main frame of straight-gauge 7005 heat-treated aluminum. The computer-bent seat tube allows for a more traditional frame design while still incorporating an elevated swingarm and rear mounted Marzocchi air/oil shock. This configuration also eliminates the need for seatpost support struts which we've seen recently on other fully suspended bikes. There's also enough room for the front derailleur to be moved up to accommodate a larger big chainring for higher speed downhills. It's the first step in creating the Dual Response's lateral stiffness.

Okay, you're probably saying, "You mean this is laterally stiff for a dual suspension bike, right?" Pretty much, at least compared to some suspension bikes we've ridden lately. The swingarm pivot's mounting tube also acts as a support brace which captures the bottom bracket area. Next, the pivot is mounted almost in the middle of the bike and down low, not to mention the fact that the pivot is a 55mm unit that rotates on Teflon-coated bushings. This design reduces the amount of parts in this area, hence taking out unnecessary slop. It combines with the shock mounted behind the seat tube, attached to 7075 mounting ears, acting to contain lateral movement of the swingarm.

The most impressive and structurally sound aspect of the swingarm is the bottom mounting plate of the shock which is welded to the insides of the swingarm halves, creating a wrap-around gusset, in effect making the swingarm a one-piece unit. Diamond Back also uses stiffer 6085 T6 aluminum for the swingarm.

There's also some serious metal manipulation found in the DBR frame, and ovalization in abundance. The entire top tube is floval (round tube with flat sides), while the down tube is ovalized vertically at the head tube and horizontally at the bottom bracket shell.

While the actual length of the top tube is relatively short because of the S-bend seat tube, the effective length is quite long. The length is re-achieved by the use of the custom Zoom lay-back seatpost. The short top tube design also does two things: it

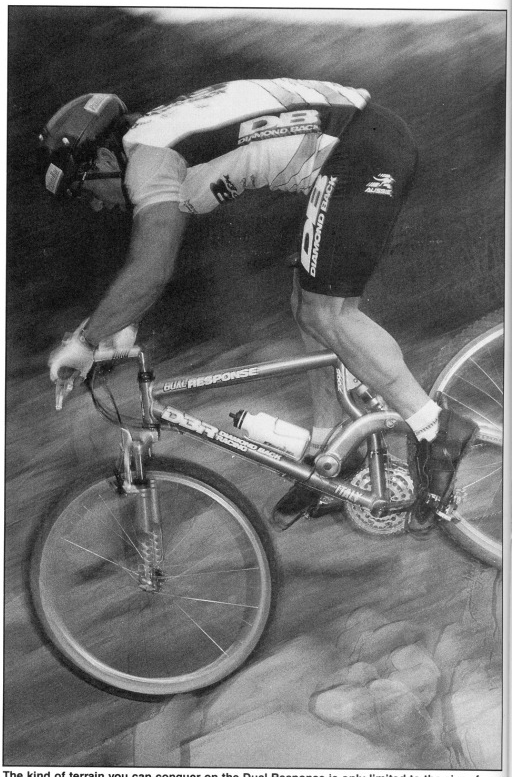
reduces weight and adds additional stiffness to the top end of the main frame.

The swingarm has a couple of nice touches, one of them not having all that much to do with the swingarm's performance. DBR has designed a simple but effective rear brake pivot arm, (dubbed Power Plus braking), that increases braking power by an estimated 30 percent while delivering balanced cable pull to the cantilevers. The other thing is the 6061 T6 cast rear dropouts; strong, light, and attractive.

At the heart of the Dual Response's swingarm is the 50mm pivot bushing. The forward position and wide surface area provide the basis for the laterally stiff frame.

The rear shock itself delivers 25mm of travel, which when multiplied by the swingarm to shock movement ratio, equates to about 50-70mm of rear wheel travel, depending on how much air pressure you run. A specially made L-valve allows for easy access to the rear shock for air pressure changes. The shock that will be available on stock models has been revalved from earlier models to make the rebound quicker, and we found that the new set-up was much better than any previous Marzocchi rear shock we've tried. In fact, we were the first ones to test the new revalving, even before DBR product engineers had gotten saddle time on it, and we'd have to say that it got a unanimous thumbs-up from all our testers.

With so much going on with the rear end, it's easy to overlook the front suspension. We recently did a fairly extensive review and test of the Marzocchi XC400 and found it to be immensely improved over last year's models. Suffice it to say that the reason the XC400 is easy to overlook is because there's so little to find fault



The kind of terrain you can conquer on the Dual Response is only limited to the size of your juevos.

with. It's lighter, has softer compression and quicker rebound, and is less prone to flex than previous models.

The rest of the components are also easily overlooked, again because they're remarkably sound in their function. To keep the cost of the complete bike down, DBR has equipped the Dual Response with Shimano's LX group, with an XT rear derailleur upgrade. Stock LX gearing is going to be a big bone of contention for 1993 because, as good as the drive train performance is, LX chainring gearing retains the XTR front gearing pattern of 26/36/46 teeth. When combined with the LX (as well as DX and XT) 12-28 teeth cogs, you get an under-geared low end. With a total weight of just (and we mean *just*) under 28 pounds (with no added goodies like bar ends or water bottles and cages), you'll want all the help you can get for climbing.

DBR does do some lightweight parts specing, such as Kevlar beaded Tioga Psycho tires and a titanium railed Avenir Comp saddle. They also save some weight by anodizing the frame instead of painting it, a trick trend for '93 that puts a

works-looking final touch on the Dual Response.

RESPONDING TO THE RESPONSE

The biggest concern with any dual suspension bike is power transmission to the rear wheel. With the Dual Response, there is no discernible loss of power delivery from frame flex. However, there is a bit of wheel "squirm" going on. Since you're still dealing with a wheel hanging out behind the bike attached only by two relatively unarticulated arms, you're getting some slight horizontal twisting of the rear wheel over rutted terrain, especially when the rear end is under load. It doesn't affect the handling to any large degree, but it is a little disconcerting, especially when you first start riding the bike.

Another thing that is inherent in the design is that when you are seated and pedaling, additional tension is placed on the chain as the rear shock rebounds from compression over a bump, giving the rider a momentary "bio-pacing" sensation that can at first be interpreted as the bike being harder to pedal. Again, it doesn't really detract from the overall performance of

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The other feature of the swingarm that keeps the frame stiff is the shock mount plate. The plate (shown from underneath) is welded to both sides of the swingarm, creating a gusset that, in effect, makes the swingarm a one-piece unit.

MFG. OR DIST.: Diamond Back
4030 Via Pescador
Camarillo, CA 93012-9864
(805) 484-4450

APPROXIMATE SUGGESTED RETAIL PRICE $2200 ($1560 for frameset including rear shock, seatpost, seatpost collar)

COLORS AVAILABLE: Blue anodized aluminum

SIZES AVAILABLE: 16", 18", 20"

SIZE TESTED: 16"

FRAMESET:

Head Tube Angle	72 degrees
Seat Tube Angle	73 degrees
Top Tube Length	22" (16"), 22.8" (18"), 23.5 (20") effective
Chainstay Length	17"
Bottom Bracket Height	12 7/16"
Frame Material(s)	7005 T6 aluminum main frame, 6065 T6 aluminum swingarm with 6061 T6 Power Plus braking bridge and forged dropouts
Frame Construction	TIG-welded
Fork Offset	1.55"
Fork Material(s)/Construction	Marzocchi XC400 air/oil suspension, cast aluminum crown, aluminum lower legs
Gross Bicycle Weight	27.9 lbs

DRIVETRAIN:

Front Derailleur	Shimano Deore LX
Rear Derailleur	Shimano Deore XT
Shifters	Shimano Deore LX, Rapidfire Plus
Cranks	Shimano Deore LX
Chainrings	Shimano Deore HyperDrive, 26/36/46t
Freewheel/Freehub	Shimano Deore LX freehub
Gearing	12/28t Hyperglide
Chain	Shimano HG 70
Pedals	Tioga Surefoot VI with Avenir clips and straps

STEERING:

Handlebar	Zoom 130g, 6 degree sweep
Stem	Zoom Competition TIG-welded chromoly, no rise
Headset	Tioga Avenger alloy, triple sealed
Grips	Avenir Kraton

BRAKES:

Front Brake	Shimano Deore LX
Rear Brake	Shimano Deore LX
Levers	Shimano Deore LX

SEATING:

Saddle	Avenir Titanium Comp
Seatpost	Avenir Ultimate, chromoly, laid back, single bolt micro adjust
Seatpost Binder	Aluminum collar, bolt binder

WHEELS:

Rims	Araya, RM-17
Hubs	Shimano Deore LX, 32-hole
Spokes	Wheelsmith double-butted 14/15 gauge stainless steel
Tires	Tioga Psycho Kevlar bead, 26"x1.95"

The specially formed swingarm and computer-bent seat tube create a more traditional elevated chainstay design that is one of the stiffest we've yet to test. You can see the pivot support tube connecting the seat tube and down tube, adding even more lateral stability.

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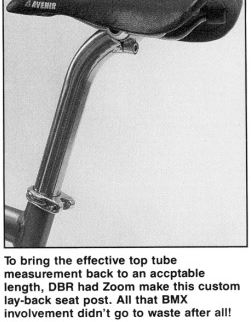
the bike, but it does take a little getting used to.

On the upside, standing up and hammering the bike gives you direct contact with the ground, which is enhanced by the rear suspension being active. Again, there was no frame flex evident, and as we would pedal over a rut or bump at speed, the bike would float relatively unobstructed over the obstacle. The bike's rear suspension did not compress under power, but still interacted with larger terrain variances. This is because of the pivot point being so close to the chain's drive line.

Slower speed climbing in the saddle was very good, except for the aforementioned lack of ultra-low gearing and bio-pacing when going over a bump while seated. The shock absorption in this case more than makes up for the bio-pacing, and the under-gearing was simply a matter of getting used to — or changing it. A 24-tooth chainring works wonders. As with any rear suspension bike (that works), rear suspension is not just for descending. Over the course of a ride, the amount of work saved by not having to compensate for a stiff rear end is significant.

Okay, enough about climbing. You really want to know how badly you can scare yourself going downhill, right? First off, let's put the Dual Response in some sort of perspective. You may think that almost three inches of rear wheel travel is excessive for a cross-country bike. There are some people in the bike industry who would agree with you, citing that rear end travel should be in the same proportion as braking power is to a bike, about 70 per-



To bring the effective top tube measurement back to an accptable length, DBR had Zoom make this custom lay-back seat post. All that BMX involvement didn't go to waste after all!

cent front to 30 percent rear. This would mean that the Dual Response has an overly developed rear suspension. *Wellllll* . . . sort of.

While there may be more suspension than needed for most cross-country applications, there's not a huge penalty being paid, either in weight or performance. And once you get to the top of the hill, you now have what is one of the plushest, yet responsive, dual suspension bikes on the market. The Dual Response would soak up basically everything we could throw at it, including four-foot drop-offs, off camber rain ruts, technical single track, and ridiculously rocky outcroppings. There was even one section of trail that had a V-ditch with a three-foot-high ledge on the back side, with barely a tire-width groove up the middle. Even better, the lead-up was fast and clear, so we could get a good run at it. The front and rear end of the bike interacted so well that we could basically go at the section at full speed and the bike would just soak up the ledge and keep on going. All we had to do is get our weight back and let the suspension do its thing. The claimed travel of the XC400 fork is an inch and five-eighths, but it felt like a lot more. As for the rear, we couldn't have asked for more responsive compression or rebound action.

On another section of fire road that has long sections of severely rutted sandstone, time and again testers could go faster and harder than on a front suspension-only bike, making treacherous sections safer, and transitions where they would have previously slowed down much smoother. We could flat-out bomb this thing!

The Dual Response is certainly no sled. Aggressive geometry made for quick directional changes, yet the bike never got really sketchy. A couple of riders noted that the front end felt almost too quick, but this really only manifested itself when negotiating tricky, slow single track. It wasn't like you felt you were going to get pitched or anything.

While the rear end wasn't overly responsive, it was tempered with the fact that you barely needed to worry where the rear wheel was because the suspension was taking care of business.

The component spec for the bike is adequate, but with the increase in speed

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because of the suspension, the LX brakes were a little under-powered. The Power Plus braking system in the rear did quite a bit to improve an otherwise minimally modulating rear brake. Shifting was excellent, as was control from the Psycho Kevlar beaded tires. About the only place these tires don't excel is loose rocky terrain. The knobs are a bit too small to get a good grip on pebble-covered hard pack. Surprisingly, although the parts group is not what you would consider ultra-light, the assemblage gets the bike into a respectable weight range for dual suspension. Start adding your own lightweight components and there's a good chance you could get this bike down to a realistic 26.5 pounds (but we're talkin' some big bucks for some small parts!).

There are differing opinions on whether or not this much suspension is even needed. But then, who cares? People want it, DBR has it, and now you can get it. Ignoring the yet to be determined viability of the bike, about the only thing we would want to improve on the Dual Response is the frame's weight. And DBR has some plans for that, too. But why wait? The bike works — now! •

The Marzocchi XC400 fork is vastly improved over last year, and was well matched to the rear end. Overall rider compartment fit was good, but the 72 degree head angle made the bike feel a bit twitchy.