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A Downhill, California Ride of New, Rugged Off-Road Bikes

Training Tips from a World Champion

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Road Test

The Klunkers of Marin

Fat Tires are Faster than You'd Ever Imagine

John Schubert

Skinny tire chauvinists, beware! Klunkers are encroaching, and they will radically transform your long-held beliefs about bicycles.

At first glance, they look slow and clumsy, but they're fast and nimble. You won't believe it until you climb one and try it. As one disbelieving Cinelli owner said, "This bike is hard on prejudices."

Why so fast and nimble with fat tires and upright handlebars? Today's klunker is nothing like the balloon bike of your youth. At around 28 pounds, good klunkers are as lightweight as many dropped-handlebar sport bicycles. And, as usual, weight reduction in the wheels makes the biggest difference. Today's skinwall bal-

looner tires and aluminum alloy bal-looner rims trim six pounds—three pounds per wheel—from the weight of blackwall tires and steel rims. (Skinwall balloon tires may sound exotic to you, but they're just the beginning of an extravagant balloon equipment fest. Presta valve balloon inner tubes and heat-treated aluminum balloon rims are on the market, and we may see natural latex balloon inner tubes—molded in exotic colors, no less—later this year.) And even the tread patterns of modern balloon tires have been vastly improved, giving the bikes awesome cornering traction on loose dirt, wet grass, and other "impossible" surfaces.

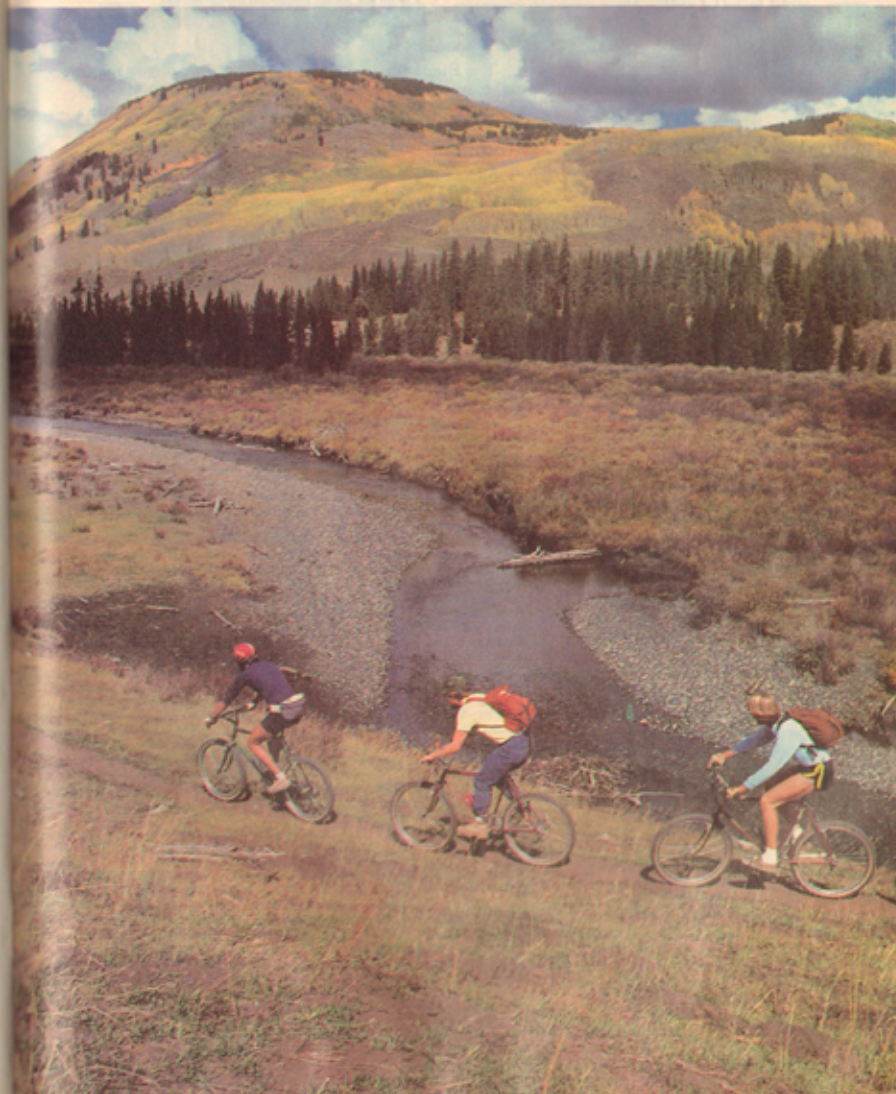
Repack Road, a terror-filled downhill which drops 1,500 feet in less than two miles, has been the site of much klunker field testing. Approaching the summit for a downhill assault are Trailmaster's Erik Koski, left, and Ritchey MountainBike's Gary Fisher. Fisher holds the downhill course record at 4:22.



Klunker Frames

The Klunker revolution includes a re-born lightweight frame that thumbs its nose at the road bike trend toward ever-shorter wheelbases. Most klunkers have frame angles of 68 to 70 degrees, top tubes about an inch longer than road bikes of the same size, ultra-high (12-inch) bottom brackets, ultra-long (18-inch) chainstays, and wheelbases up to a Queen Mary-size 44 inches.

One area where even the experts disagree is how big and tough the frame tubing has to be. At one extreme, Oregon framebuilder Jim Merz has built competition klunkers from thin-walled Colum-



David Goffman photo

Road Test

bus SL tubing, explaining, "I like to ride a real light bike."

The more common approach, though, is to build the bikes extra sturdy, with oversized tubing. (For example, a road bike has a down tube of 1½ inches outside diameter. Klunkers often have 1½-inch down tubes.)

But oversized tubing doesn't mean "extra-heavy" the way it did with the balloon bikes of yesteryear. High-quality balloon bikes are made from chromolyderium steel tubing, and with steel of this quality, an ultra-study tube will have a wall thickness of around 1.0 millimeter. (Two common wall thicknesses used in balloon construction are 0.035 and 0.049 inch, which translate to 0.9 mm and 1.25 mm respectively.) Thus, a klunker frame sturdy enough to withstand all sorts of high-speed off-road riding need weigh only a pound or two more than a high-quality road bike frame.

Rider Position

A simple, but important change in rider position makes the new klunker far more comfortable than earlier upright bikes. Klunker handlebars do not sweep back toward the rider—an unsuitable position which puts your hands too close to your body and forces you to bend your wrists to grab the handgrips, all for the illusory comfort of having the handgrips near you.

Klunker handlebars are almost straight and as much as a couple feet wide. Your arms stretch out in front, you lean forward slightly, and the position is quite comfortable.

Moreover, the klunker position makes cycling feel easy and natural. A novice who would wobble all over the road on a dropped handlebar bike feels quite steady and secure on a klunker, and accomplished dropped-handlebar cyclists find the change relaxing and refreshing.

Klunker Origins

How did these bikes come to be? It turns out that off-road riding on fat tires has been a closet fad for many years. All over the country, small pockets of cyclists have supplemented their skinny-tire road riding with the joys of fat-tire, off-road riding. While many of these off-road cyclists contented themselves with riding on old, beat-up Rollfast newsboy bikes, some were more ambitious.

Among the most ambitious were the off-road cyclists in Marin County, California, where people are never hesitant to put a lot of effort and money into impro-

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Road Test

able ventures. The towns of Marin County are nestled against some strikingly beautiful mountains, and the mountains abound with fire roads and hiking trails. Thus, the surroundings attracted many people to klunker riding. Moreover, Marin County enjoys a high concentration of accomplished cyclists, framebuilders, and equipment experts. Several of these people were enthusiastic off-road riders, and they worked together to design and build the first high-quality klunkers.

Gary Fisher, author of many of *Bicycling's* road tests and a Category 1 road racer, was one of the Marin Klunker riders. In the mid-1970s, he was the first on his block to add five-speed derailleur gearing to his newsboy-style klunker. Other klunker riders took notice. Bit by bit, various riders added improved road bike components to their klunkers.

Then, talk of chrome-moly frames started. By most people's standards, it would have been ridiculous to spend that much time and money on a better klunker frame. Only heavy steel rims and poorly-designed blackwall tires were available, and other high-quality klunker components such as chrome-moly handlebars hadn't yet been dreamed of. Why toss a mega-expensive handbuilt frame in the midst of all that dreary componentry?

"Because we craved a better klunker," responds Charles Kelly, another Marin klunker rider. "We all had good road racing bikes, and we were aching for that kind of quality in our off-road bikes."

One of the Klunker contingent was Craig Mitchell, an innovative and creative framebuilder who had previously proved himself with the dramatically fast Sofa Cycle recumbent, built in 1976 and reviewed in *Bicycling* in June 1980. Mitchell was the experimental type. That same year, he built the first chrome-moly klunker.

Then in 1977, Mill Valley framebuilder Joe Breeze, who was nationally known for his achievements as a member of the famed Otis Guy-Joe Breeze tandem racing duo, built ten klunkers. Breeze thought that he would thereby saturate the market for high-quality klunkers and end the whole thing. To his surprise, they were all sold before they were built.

Breeze had added a couple inches to the wheelbase of Mitchell's design and slackened the frame angles. The early "Breezer" klunkers had single-bike tubing with twin lateral reinforcing stays, and with their more stretched-out geometry and ultra-rigid frames, they handled beautifully in the dirt.

In 1979, the klunker industry got a giant

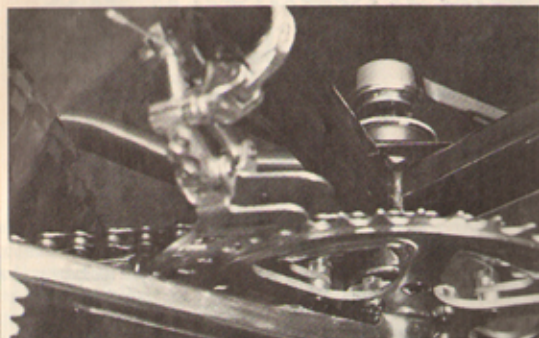


(Left) Tom Ritchey's MountainBike shows off its businesslike front end: motorcycle handgrips and brake levers, handy thumb shifters, and bullet-proof Bull Moose handlebars. Note also the second set of water bottle cage bosses on the seat tube and the black anodized T.A. triple crankset. Arne Ryason photo.

(Below) Among the new generation of factory-built klunkers is the Univega Alpina Sport. Dozens of similar bikes from a variety of manufacturers will appear in the next year or two. Courtesy of Wossner/Matsusawa Advertising



Road Test



Power is applied to the Specialized Stumpjumper via a T.A. triple crankset and shifted by SunTour ARX derailleurs. Note the bend in the left chainstay to clear the fat tire. In a fitting tribute to Tom Ritchey's MountainBike, the seat tube is flattened at the bottom bracket shell for greater lateral rigidity.



The seat cluster on the nickel-plated Breezer includes a tidy pump-retaining peg.

Lunar Cruise in Marin

Maura K. Daly

Full moon trail rides are an exciting tradition with San Francisco off road pedalers. Using only lunar light, a group of riders cruise up a local mountain, picnic at midnight on top, and fly down the illuminated trails. These dedicated "moon barbers" ride with confidence in their bikes, knowledge of the trails, and a strong faith in their protective sixth sense.

As the moon rises over the San Francisco Bay, riders gather at the appointed place and stylishly practice slides and jumps as they wait for late arrivals. When the group is complete, they start at a local fire road and begin pedaling up the slopes of the sleeping mountain.

In the shadow of fragrant redwoods, the pack lengthens out as the riders establish their individual pace. The only sound is the soft "click, click" of a practiced gear change, or an occasional right hand out for an appreciative glance at the glowing moon. Riders pause to take off

an extra jersey, adjust a seatpost, or drink from one of the flowing creeks before continuing their nighttime ascent.

After two hours of steady riding, the last of the group reaches a ridge near the top of the 2,500-foot mountain. The stragglers dismount and join the quicker riders who are already sprawled about on the soft grass. Above the fog the ridgetop weather is a comfortable 70°, and the view of San Francisco and the Golden Gate Bridge is impressive.

While admiring the panorama, everyone digs into their loaded panniers and backpacks for their midnight energy offerings. A strange collection of cold beer, gorp, bread, cheese, orange juice, and a well-shaken bottle of champagne are shared in the starry night.

Then, after a mandatory full moon howling session, the group prepares for the ride down. They lower their saddles, let air out of the knobby tires, and don

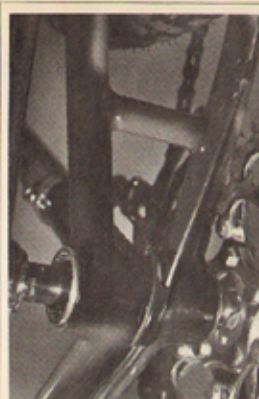
jerseys. With the more experienced and wilder riders in the lead, they start down on a well-banked dirt road.

The trail is illuminated only by the moon, and when it slides behind a passing cloud, the riders continue in darkness. The sound of wheels snapping twigs and rolling over a carpet of leaves is interrupted only by an occasional shout from the front riders, warning of a surprise in the road.

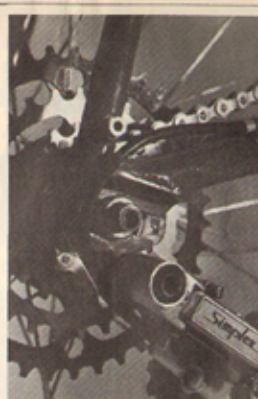
After a mile of switchbacks the riders take a sharp right. At the start of a narrower trail they hop off and carry their bikes over the first collection of five-foot boulders, then jump on and head down the steep valley.

Encountering rocks, ditches, and streams, the faster riders stand up with the pedals parallel, using the seat between their legs for leverage as they jump over hazards.

The advice offered to beginners is "Don't hesitate," and the experts live by it as they travel at a constant speed through all obstacles. But everyone cruises at his own pace, and all reach the trail-end with but a few scrapes from branches they've whipped past. Everyone has some comment about the thrill of the descent, then they depart with promises for another howl at the next full moon. ☐



The Mountain Goat's seat cluster and bottom bracket display a number of cute tricks. The oval top and down tubes join neatly into the bottom bracket shell and the chainstays. The two-in-one cable guide is clean and neat. And the camouflage paint job is very distinctive.



Specially-made rear dropout for the tig-welded Trailmaster.

Klunkers

Continued from page 39

helping hand from two other California bicycle trends. The demand for high-quality beach cruisers in southern California and for adult-size 26-inch BMX bikes all over led Araya and Ukai to offer 26 x 1.75 aluminum alloy rims. And in 1980, Cycle Pro followed with the first 26 x 2.125 skinwall balloon tire—the Snake Belly.

Suddenly, an expensive klunker "made sense." With the sandbag wheels gone, it looked and felt as if it was worth a steep price tag. The bike had a wonderful combination of nimble ride and handling, plus rugged capability.

The easy-to-ride, reborn klunker could silently go over trails that no jeep or motorcycle could manage, opening up a whole world of backroad touring and rac-

ing. Its stability and ruggedness on the street were a welcome change. And it was a \$1,400 bike you could let a novice test-ride without worrying about either the bike or the rider. This turned out to be the klunker's best feature; close to half the buyers of expensive klunkers to date have been people who have never bought a skinny-tire bike.

All this leads me to a startling conclusion: I predict klunkers will overtake dropped-handlebar ten-speeds as America's favorite bicycles just as soon as enough manufacturers make them available in appropriate quantities and price levels. It's so much easier to enjoy yourself on a klunker than on a dropped-bar bike, and the klunker is so much more

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Road Test

practical on our recession-era potholed roads, that klunkers will prevail.

The Market Today

Until this year, almost all klunkers were made in small quantities by a number of West coast framebuilders. Some of these framebuilders took their inspiration from the Marin County movement; others developed their klunkers independently. By now, though, all have had a chance to examine each other's bikes and compare designs. And the bikes are generally similar to each other, just as road bikes are.

The more alert large-bicycle companies are moving fast to tool up for the klunker market. A few are already selling klunkers; many more will be doing so in the next year or two. Already, klunker production has spread to Japan; English and Italian companies have also expressed an interest.

With this diversification comes welcome news: falling prices. There will always be top-of-the-line handbuilt for those who must have the best, but mass builders—especially those clever Japanese—are hard at work making cost-effective klunkers. Already, prices for good Japanese klunkers are half the cost of custom handbuilt. This trend is bound to continue, just as it has for road bikes.

For this test, we were able to gather nine klunkers representing various builders and styles. The Specialized Stump-jumper is a brand new Japanese import. Erik Koski's Trailmaster and Joe Breeze's Breezer are Marin County-born and bred originals. Jeff Lindsay's Mountain Goat was conceived and built independently of the Marin movement in Chico, California. Oregon's Jim Merz built a one-of-a-kind competition bike specially for the national cyclocross championships; the Schwinn King Sting is an adult version of a high-quality BMD, bike with wide range gearing. And Tom Ritchey, a prolific framebuilder whose exceptional output makes him the General Motors of klunkers, contributed three bikes to this test: the first-ever high-quality klunker tandem, a lightweight competition bike using Finnish 650B tires, and his top-of-the-line standard model, Berest.

Off-Road Testing

My 17 years of dropped-handlebar cycling turned out to be an all-but-useless credential for testing klunkers. The riding style is different, new muscles get sore, the Marin riders I joined could all descend faster than I dared to, and the fi-

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Rudolf Hensch, Engineer
Chief Designer

Engineered for victory, the Ultima is one of four World Class racing machines by Puch/Austro-Daimler. Meticulously hand-built of Reynolds 531 SL tubing, it features all Campagnolo Super Record componentry, 12-speed gearing, a specially engraved stem and fork crown, plus the Cinelli VIP seat and handlebar leathers. This bike is truly the ultimate in race-proven performance.



VENT NOIR

"PUCH'S FAST TOURING BIKES OUTCLASS MANY COMPETITIVE RACING MACHINES."

Friedr. Volk,
Chief Production Manager

One of six fast touring bikes, the 18-speed Vent Noir is a masterpiece of versatility. The Reynolds 531 double butted frame and fork are hand-brazed. The crank is T/A Cyclo Tourist. Rear derailleur is the titanium Duo-Par. Carrera sidepull brakes by Wehmann. At 22 lbs., it's the lightest 18-speed we know. And there's no competition for the elegance of its scratch resistant, black chrome finish.

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Dr. Otto Jandach, Director
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Hans Neukirchner, Engineer
Touring Division

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"PUCH BIKES ARE BUILT TO LAST AS LONG AS YOU DO."

Dr. Hans Danzer,
Chief of Quality Control

The 12-speed Pathfinder is one of five models proving Puch's ability to deliver outstanding value in a bike for everyday use. It offers the lightness of alloy rims, plus the new Sun Tour AR alloy derailleur system.

Road Test

ness to pick one's way through a Boulder-strewn trail or maintain momentum through a mud bog does not come in a day. Thus, I was unable to make hair-splitting judgments about the differences between one bike and the next. But I did develop preferences in some areas:

• **Hand position:** As previously described, klanker handlebars put your hands straight out in front of you and wide apart. Because the bars are wider, you feel more stable. But too much width can be too much of a good thing. I found that the widest bars I used (26 inch) made me wobble at slow speeds. I found it hard to keep my arms steady and my steering corrections slight with my hands so far apart. The trade off is that wider bars are more desirable for high-speed gonzo downhill, and that one can learn to ride steadily at low speeds with them. All it takes is time. Also, wide handlebars aren't a big problem. They can be shortened in seconds with a hacksaw.

• **Head angle:** Klanker head angles fall between 68 and 70 degrees. I developed a fondness for the 70-degree angle, for the same reason that I preferred narrower handlebars: it made slow speed stability easier. The trade-off is exactly the same: high-speed stability improves with the more shallow angle. The shallow angle puts the front wheel farther in front, improving the bike's handling during high-speed both-wheels-skidding hairpin turns on dirt. (Yes, these are real design considerations in off-road bikes.)

• **Gearing:** Most bikers use ultra-wide-range 15-speed and 18-speed gearing. One who doesn't is Erik Koski. "When you double shift on rough trails, you lose a lot of your inertia, so the extra gears don't do you any good," Koski points out. He prefers a six-speed SunTour 13-38 freewheel for a range of 30 to 95 inches. Jeff Lindsay splits the difference, offering a 12-speed drivetrain as his standard setup. (Of course, all these custom builders will sell a customer whatever he wants.) I continue to prefer the triple chainwheel approach. On the dirt, I usually left the front derailleur on the middle chainwheel and shifted Koski-style.

Balloon gear is all crossover. No half-step-plus-gearing setups have appeared yet. Half step would be as fine as ever for pavement use, but worthless in the dirt.

The Bikes

Ritchey Everest: Tom Ritchey's Everest is the most plentiful of the high-quality blankers, and it's a good basis for comparison. (The bike only recently acquired the name Everest, and is known to

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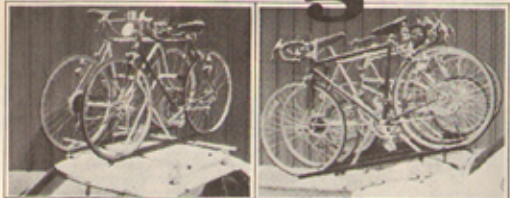
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Road Test

most people simply as the Ritchey MountainBike.)

Ritchey's chrome-moly straight gauge frame uses a .049-inch down tube and .035-inch tubing elsewhere. Both it and Ritchey's Bull Moose one-piece handlebar-and-stem unit are quite rigid. Of course, the stretched-out geometry makes this frame shock-absorbing, but the balloon tires absorb far more shock than the frame. Thus, the Everest feels a bit different from a lightweight road bike, which has more flex in the frame and far less in the tires. It's a pleasant, secure feel, not to be confused with the soggy, leaden feel of heavier mild steel klunker frames.

Early Ritchey bikes used a 68-degree head angle; now they're 69 degrees. I still prefer 70, although this is an area where reasonable people might disagree.

Like most klunker builders, Ritchey uses Magura motorcycle brake levers and Mafac tandem cantilever brakes. The reassuring braking power and easy grip dare you to go fast. Other components typical of balloon componentry include a T.A. triple crankset with long arms (your choice from 175 to 185 mm), Bullseye sealed bearing hubs, a quick-release seatpost, and SunTour MP 1000 sealed-bearing BMX pedals. Ritchey uses a sealed-bearing bottom bracket that's untheaded; the bearings sit on shoulders on the crank spindle, and the assembly is held in place with retaining rings. Ritchey's legendarily quick hands do a fine job of finishing the fillets on his legless brazing work.

The Everest costs \$1,528; two "economy" versions are now also available at \$1,064 and \$1,211.

Trailmaster: Erik Koski's Trailmaster is as rigid and bulletproof as a klunker can be, with oversized .049 chrome-moly tubing throughout. The bike I rode even had straight forks with offset dropouts like BMX forks. (Koski is changing over to a standard raked fork for current production models.)

But even with these forks, the bike was no boneshaker. The Trailmaster uses aluminum handlebars; these bars absorb more road shock than steel bars, and they are easier to hang onto at high speeds over bumps and rocks. Ease of hanging on is a phenomenon that defies measurement, but I surmise that the aluminum bars compensate for the less shock-absorbing forks.

While I liked the feel of the aluminum bars more, the appearance of the steel Ritchey Bull Moose bars is hard to top. And many riders prefer the steel bars for their all-out ruggedness. Again, this is an

area where reasonable people might disagree.

The Trailmaster is tig-welded, not brazed, because there is no cleanup required after tig-welding. "In theory, tig-welding reduces the price," Koski says. Handmade dropouts specially designed for a tig-welded frame and other labor-intensive finishing touches ensure that the bike won't ever be too cheap. At about \$1,500, the Trailmaster should be bought for its good design, its great feel on the trail, and its ruggedness—not for the "economy" of tig-welding. Components are top-notch, including Phil Wood hubs and bottom bracket.

With a 70-degree head angle, the Trailmaster was a teeny bit easier for me to control than the Ritchey. But even Koski, a fellow who respects his competitors, was reluctant to boast that his bike would ride better—even when I pressed him on the question of handlebar stiffness. "They ride quite similar," he said. "It comes down to equipment and workmanship."

Breezer: Joe Breezer is known locally for his meticulous and painstaking craftsmanship, and the owners of his bikes are quite proud of them. One frame he built got such a thorough and immaculate

Charles Kelly, who wrote the riding technique article which begins on page 110, demonstrates the versatility of klunker riding: when you reach terrain that's unrideable (in this case, too much brush underfoot), you can carry your klunker. Gary Fisher photo.



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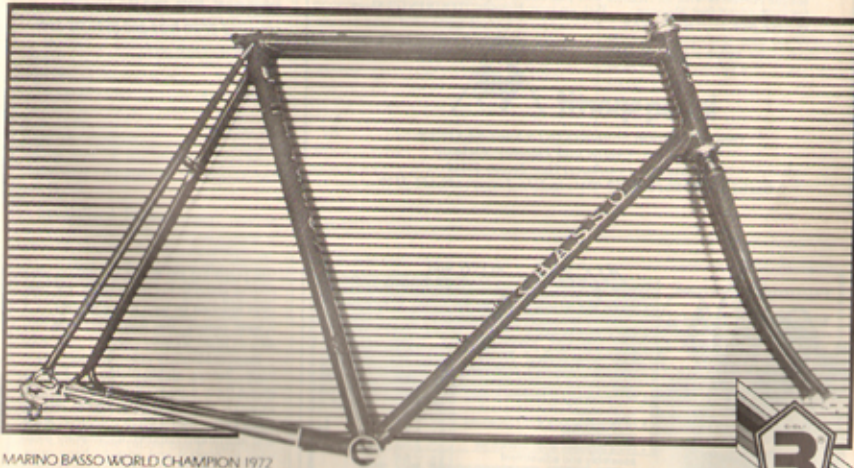
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Road Test



Tom Ritchey's MountainBike frameset features a sealed-bearing bottom bracket with a unique installation system. Cartridge bearings sit on shoulders on the crank spindle, and a circlip holds the assembly in place. This allows the use of larger bearings than the usual threaded cup bearing arrangement. Note also the 1 1/4-inch oversized down tube and ovalized seat tube. Arne Ryason photo.

nents is there. A Breezer will cost you about \$1,588.

Mountain Goat: Jeff Lindsay's Mountain Goat is the most radical klunker I've seen. It uses .035 Phil Wood oval chrome-moly tubing for the top and down tubes in hopes of improved lateral rigidity and shock absorption.

Frankly, I couldn't tell whether the oval tubing made much difference, but for this you must blame the rider and not the bike. My off-road reflexes aren't well-enough honed. But I could tell that I liked the Mountain Goat's feel; like the other bikes in this test, it was comfortable, reassuring, and easy to control in the dirt. Sharp S-turns on pavement proved to me that the frame has a nice, secure feel and plenty of torsional rigidity.

One of the Mountain Goat's most striking features is the \$30 optional camouflage paint job. Lindsay reports that customers have a hard time resisting it, and with good reason: it's original and it's striking.

Lindsay makes his own chrome-moly handlebars. They're less triangulated than Tom Ritchey's; perhaps they absorb a bit more road shock.

When Lindsay came to Marin for the off-road test, he rode the Ritchey tandem described here. It inspired him so much that he reports Mountain Goat tandems will be available soon.

The use of oval tubing allows Lindsay to use a number of striking and attractive touches in his frame design. The down tube cradles the underside of the bottom bracket, and the seatstays sprout out the rear of the top tube in a very clean design. The camouflage paint is a fine addition. And, oh yes, the 70-degree head angle suited me just fine. Mountain Goats are \$1,350.

Specialized Stumpjumper: Bearing the same name as Specialized's popular off-road tire, the Stumpjumper was designed after careful scrutiny of a Ritchey MountainBike. It's built in Japan and given a more casual cosmetic finish than the megabuck bikes mentioned before; this cuts the cost almost in half without seriously impairing the bike's function.

Breezer klunkers enjoy this same mystique. Breezer nickle-plates the frames, giving them a chrome-plating job. Breezer bikes come with a 70-degree head angle and aluminum handlebars, making them easy to control and easy to hang onto. (It's a good thing, because when I visited Joe, he took me riding over a very narrow hiking trail that traversed a steep hill!) The usual batch of top-notch compo-

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Road Test

er is the first of the cost-effective klunkers from the Orient.

Merz: Jim Merz's competition bike is a lightweight extreme, using Columbus double-butted SL tubing with wall thicknesses of 0.9 mm in the butts and 0.6 mm in the midsection. It's not a bike for lashing into trees.

I rode the Merz a day after Tim Rutledge used it to nab tenth place in the national cyclocross championship race. I found it delightfully lithe and controllable in the dirt. On this special-purpose bike, the 69-degree head angle is klunker geometry, but the rest of the bike is classic cyclocross geometry: 17 1/2-inch chainstays, and a top tube one inch shorter than the 23 1/2-inch frame size.

Merz, never one to shirk from hard labor, cut, splined, and welded two fork crowns to make a special wide fork crown to give this bike adequate tire clearance. Other handwork included a cyclocross chainguard and pedal thread adapters for Shimano cranks. The bike used Finnish 650B tires.

Merz normally uses 1,003,71.0 mm top and seat tubes with a 1.21, 0.12 mm down

tube to build standard klunkers. (That down tube size is no longer made; Merz has a supply of old ones once made by Reynolds.) By Marin standards, that's still lightweight, and that's where Merz's heart is.

"If you're trying to go fast, you should make it on the leading edge of breaking down," he says. "These bikes are custom. If someone is a good rider and wants a light bike, then that's how I make it." Like all custom builders, Merz is willing to adapt a bike to a customer's needs—and that includes light bikes and not-so-light bikes.

Merz charges \$800 for a custom frame. He estimates that the competition bike I tested would run \$1,600 to \$1,700.

Ritchey Competition: Ritchey has built a few lightweight competition klunkers. The one I rode had studded versions of the Finnish 650B tires—perhaps good news for ice and snow, but I had no chance to try. Besides, availability of those tires is poor in the United States. The Soviet Union bought a full year's production from that tire factory.

The Ritchey Competition was closer to the Merz than to standard Ritchey bikes. The lightweight bikes feel more lithe, but I'd rather have the durability myself. The Competition model is made and priced to order. It has a 70-degree head angle.

Continued on page 112

Styles for the Wilds

Off-Road Technique

Charles Kelly

Riding an off-road bike over rough terrain requires handling skills above and beyond those needed for road riding. Experienced off-road riders can ride over almost any surface, their bikes seeming to flow over rocks, logs, and ditches, up and down incredibly steep and rough slopes. On wide open descents they can go heart-stoppingly fast, even though the bike may not be lined up with the direction of travel and appears to have no solid connection with the earth's surface.

This is possible partly because of the

bike itself; the long wheelbase and shallow angles protect the rider from going over the bars and provide stability, while the nearly universal use of a quick-release seat binder allows a wide range of seat height selections for different types of terrain.

On uphill the saddle is kept at maximum height so the rider can get enough leg extension for a powerful stroke, while remaining in the saddle to keep the rear wheel from losing traction. The limit of climbing is not necessarily steepness, but traction and the rider's ability to keep the front wheel from lifting off and the rear wheel from spinning.

On downhills, trails, and extremely rough terrain, the saddle is lowered, sometimes right down to the level of the top tube, and for the most part the rider stands, to absorb shock and to permit rapid weight shifts and maneuvers. When standing, the rider must keep the cranks horizontal with equal weight on each pedal. One of the most common mistakes of beginning riders is to put all the weight on one pedal, which is then in the lowest position, and dangle the other foot, presumably to protect from falling over.

What this really does is reduce control by throwing the bike off balance, eliminate the shock absorption of the knees, and reduce maneuverability to nothing.

This position almost invariably ends with a "high-side," in which the rider falls toward the side with the weight on the pedal; since he can't put the foot down in time, he comes quickly down to earth—literally.

Standing properly on the bike, a rider should have no trouble riding down a flight of stairs. Also, the only time a rider should remove one foot from a pedal is while in the saddle and cornering at high speed, a somewhat unlikely activity for most off-road explorers.

The easiest way to damage a bike is with a frontal impact, and this is not always with a solid object such as a tree. More commonly this is caused by dropping into a hole or ditch with the front brake engaged, which sends the rider over the bars and the frame or forks to the top tube, and for the most part the rider stands, to absorb shock and to permit rapid weight shifts and maneuvers. When standing, the rider must keep the cranks horizontal with equal weight on each pedal. One of the most common mistakes of beginning riders is to put all the weight on one pedal, which is then in the lowest position, and dangle the other foot, presumably to protect from falling over.

What this really does is reduce control by throwing the bike off balance, eliminate the shock absorption of the knees, and reduce maneuverability to nothing.

Timing is one of the important elements of controlling the off-road bike. Since the front end must be lifted over various obstacles, the rider needs to raise the front wheel at the proper instant, then throw his weight forward as soon as the front clears to reduce impact on the rear wheel. In its simplest form this is the same as riding directly at and up a square curb.

In extreme situations such as washouts, shortcuts, or deep stream crossings, the bike must be carried, and this, too, has a particular technique. Assuming that the bike has a diamond frame, I recommend carrying it in the same manner as a cyclocross bike: pick it up from the left (non-drive) side, stick your right arm through the frame, and grasp the handlebars at the stem clamp. Carry the weight of the bike on the outside of your shoulder, where it rests on the large muscle rather than on the bone; the right hand controls the angle and direction of the bike.

Confidence in the machinery is essential, since any hesitation is usually paid for with skin. Confidence comes only with experience, so it pays to practice handling under controlled conditions before attempting radical maneuvers in the boonies. After a while you should be able to amaze your friends by riding down the front steps on your way to a bike ride. ☐

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