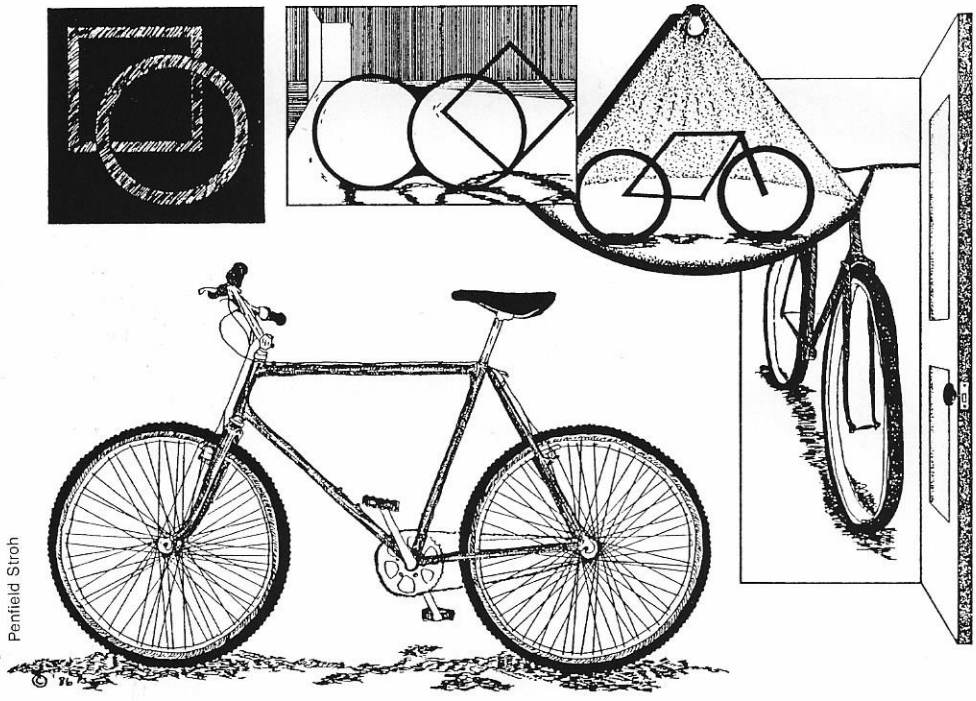
EDITORIAL

It is unlikely that the fat tire movement would be moving at all today if riders still had to put up with the wheels that originally got things rolling off-road. Only a fanatic could have loved the drum-brake, steel rim, heavy-tire wheels that were original equipment on the first mountain bikes in the mid-seventies.

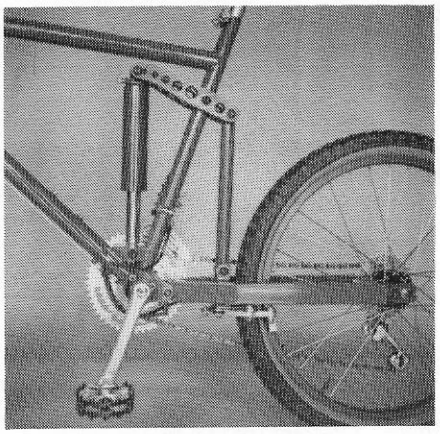
Traditional bicycle wisdom says, "An ounce on the rim is a pound on the frame." What this means is that a small reduction in rotating weight on the wheel will improve performance the same as a major weight reduction on the bike as a whole. If an ounce saved on the rim equals a pound of performance, consider this: in the last ten years, alloy rims and new tire technology have taken a total of six pounds off the average pair of balloon-tire wheels. According to the ratio cited above, this should improve performance the same as reducing the overall weight of the bike by ninety-six pounds! Obviously, there is a limit to rule-of-thumb ratios like this, because this is more than even the heaviest clunker bike ever weighed.



Penfield Stroh

Fun with figures aside, it is obvious that the improved wheels and tires are the basis for the Fat Tire revolution. Mountain bike wheels are now in many cases lighter than the skinny-tire wheels that come with cheap ten-speed bikes. This trend should eliminate the need for cheap ten-speeds.

With this issue we take a look at the heavier issues concerning lighter wheels, as well as a lighter look at a heavier subject, building wheels. Not because it means anything, we'll leave you with a quote from a latent bicyclist, John Fogarty, who prophesied the mountain bike by at least ten years when he first growled, "Big wheels keep on turnin'..."



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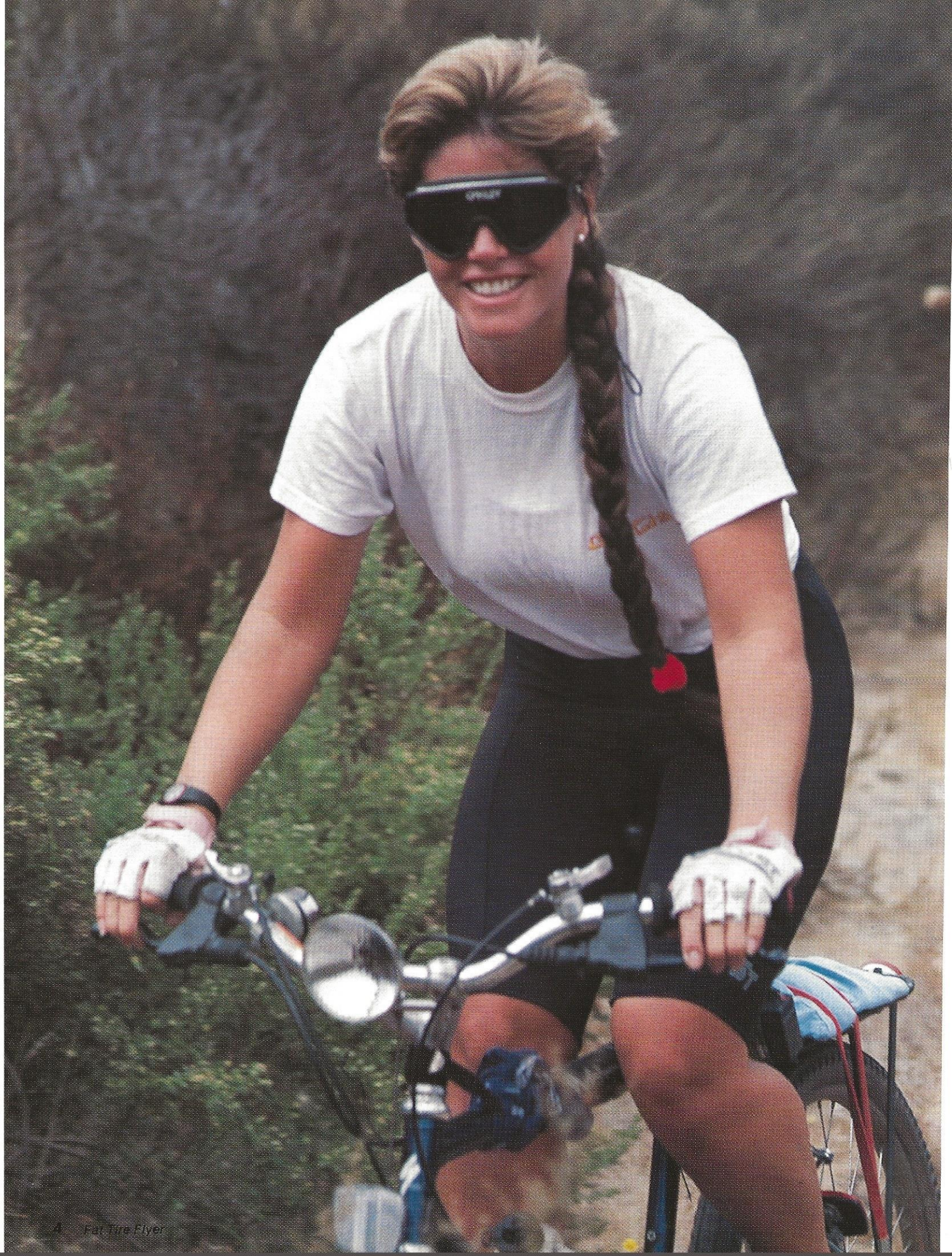

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VOODOO WHEELBUILDING

BY EARLE YOUNG

Have you ever had a wheel that came apart for no apparent reason? Or one that seemed to last forever despite years of abuse? I once started a 200 mile trip on a wheel I had talked about rebuilding. My boss said if it was still round and true I should leave it alone (the old "If it ain't broke, don't fix it" theory). The wheel heard me. It must have. How else can you explain a wheel that had been fine for thousands of miles coming apart on the long ride?

Sometimes wheels put up with abuse when they have no good reason to. An example of this phenomenon was the night I drove a borrowed bike into a ditch. It would have been a long cold walk to the car, and I was sure the front wheel was history. Wrong. The wheel was just fine.

They were nearly identical wheels, with no reason to last differently, except that one was built under the light of the full moon and the other must have been built on a rainy afternoon. Or maybe one was built by the legendary local builder and the other by the competition. You just had a good feeling about the one, and weren't sure about the other.

You probably thought wheel building was a science.

It takes faith. Depending on whom you listen to, everything you know is wrong. Everything wrong is right. Spokes have to be tight. Spokes have to be loose. No matter what opinion you may have about building wheels, you can find an expert who agrees with you and has conclusive scientific proof of that you and he are right, and another equally qualified expert who can quote chapter and verse along with abstruse algebra to prove that your theory is wrong.

Just as voodoo only works for those who believe in it, the "science" of wheel building only works for those who believe in it.

It takes faith. Wheel building is so hard that it takes years to master. Wheel building is so easy that you can do it right the first time. The first wheels I ever built worked (more or less) for a long time, but several sets I built later died early deaths. I began to lose faith.

It takes faith. "My way is the only right way, everyone else is just lucky."

It takes faith. There is more voodoo involved in wheel building than anyone who makes a living at it will admit.

Voodoo? Hold it right there, buster. What do you mean, voodoo?

Just as voodoo only works on those who believe in it, the "science" of wheel building only works for those who believe in it.

You can't really believe that stuff about pins and dolls, mojo, and gris-gris?

Of course I don't believe it, but ask your local zombie. When the shaman holds a match to the doll's foot, the zombie dances. He has faith. Faith is a powerful tool. If you don't believe that, look at how many people have been killed in the name of faith.

Faith is what holds a lot of bikes up. You have to believe in the ritual. You have to believe in the Bible, whether it be the Gospel According to Jobst Brandt, Leonard Goldberg, Robert White, or any of the dozen other gurus

who has written the Bible of Wheel Building.

No two of them agree on every part of the ritual, no two of them use precisely the same equations or parameters, yet each of them has a reputation as a good wheel builder.

Excellence takes sacrifice. *But voodoo?* Can you think of any other reason for a wheel to fold in the truing stand? It isn't science.

Look at the symbols. The wheel is the great mandala; consider the importance of the crossings, three crosses or four? Does one honor the Trinity and the other the Four Winds? What about radial lacing? Spokes doomed never to cross, radiating out into infinite space. If that isn't voodoo, at least it's metaphysical.

Carl Silverman

Of course, there is always The Book. The Book will make your wheels right. The formats are all similar. After the author recites his litany of theory, taking a complex set of equations, throwing out a variable or two to make the equations fit his theory, he then describes his ritual in the minutest detail, warning you that any deviation will result in a wheel that will collapse when you look at it funny.

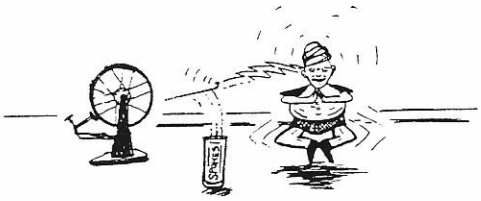
Faithful followers of each wheel guru will claim that the first wheels they built following someone else's directions fell apart the first time they rode into a ditch. After that they tried four or five other methods, and finally found one that worked. It seldom occurs to the Faithful that they learned enough from building and trashing half a dozen sets of wheels that they could have used anyone's directions and come up with a working pair of wheels.

Ritual. The legendary European teachers emphasized ritual. First lace one side of the wheel, then take it apart and do it again. And again, and again, and again until the ritual is repeated without thought in true zombie fashion. The man who taught me to build wheels achieved his zombie state by building wheels in front of the television. The truing stand itself can induce the zombie state if it is placed just right.

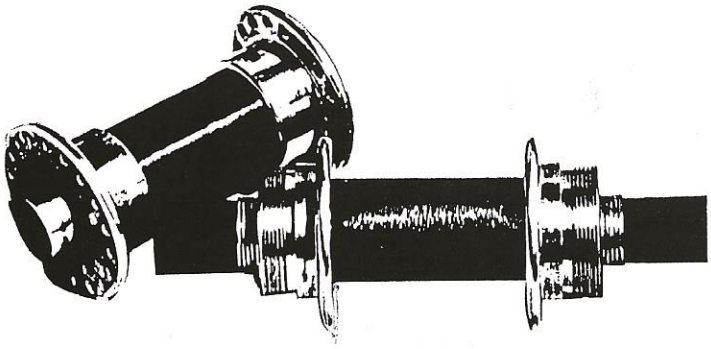
The truing stand itself can induce the zombie state if it is placed just right.

The Gospel According to Earle says that mountain bike wheels are so much stronger than they usually need to be that even a half-decent wheel will last for a while. The only way to find out whether your wheels are among the best is to go out and beat them mercilessly for three or four years, then see what it takes to retrue them.

You say you've never had a set of wheels last that long? Now you know why instead of snatching a pair off the mass-produced shelf, you pay the fifty bucks and make the necessary supplications, or whatever it takes, to get a set built by a qualified wheel guru who can impart the aura of perfect roundness.



Charles Kelly



WHEELS

What's to know about wheels? I mean, you already have a pair on your bike, don't you? Actually, there are a few things worth knowing about mountain bike wheels for purposes of evaluating the quality of the wheels on a prospective purchase or for obtaining a second set.

The majority of bicycle riders have no reason to build their own wheels. Wheel building is a skill that takes a little while and a few bogus pairs to develop, and most riders would rather pay ten bucks or so to someone who has already acquired the skill in return for whatever services are desired, either truing or building. Of course, hands-on practice in wheel building goes a long way toward bringing wheel theory to life, as much as a knowledge of engines gives the driver a better understanding of how a car works.

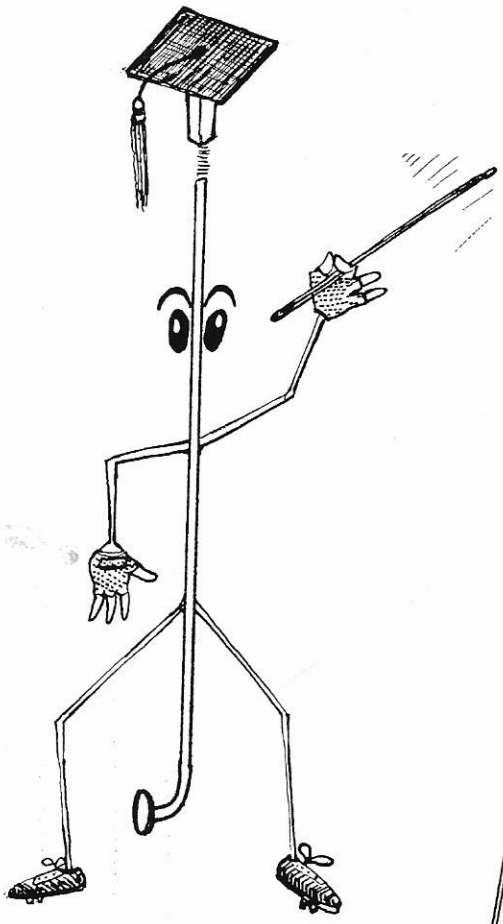
Mountain bike wheels are commonly built with a four-cross pattern. Most riders assume that this is because four-cross is the strongest method of wheel-building, but a major factor here is the discovery made by early mountain bikers that a 26-inch rim could be laced to nearly any hub with a four-cross pattern and 270 mm spokes. Relatively speaking, the difference in torsional resistance between three-cross and four-cross is small; according to Dan Price and Arthur Akers writing in *Bike Tech*, the four-cross has 17% more torsional resistance than the three-cross (torsional resistance is the the hub's resistance to rotation independent of the rim's rotation).

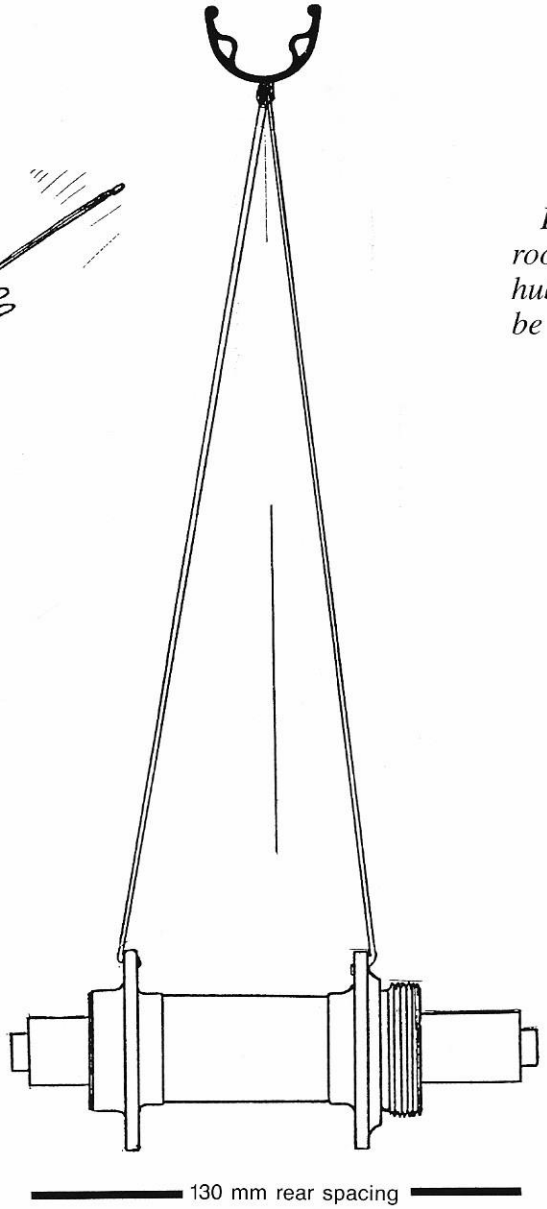
By contrast the uncrossed or radial wheel has virtually no torsional resistance, and for this reason a radial cannot be used for a rear wheel. Radial wheels are now and then used as front wheels because there is little if any torsional load on the front hub. Winkel Wheel of Seattle builds radial front mountain bike wheels with aerodynamic spokes (a wide knobby tire probably creates more wind drag than the spokes, but what the hey), along with a rear wheel that is radial on the left side and three-cross on the right.

Because the spokes are shorter, radially spoked wheels are the lightest design. One problem with radial wheels is that the forces of the spokes on the flange are not balanced as they are on a tangentally spoked (crossed) wheel. On a traditionally laced wheel, each tangental spoke has a spoke pulling in the opposite direction, and the direction of the pull is along the flange rather than away from it. On a radially spoked wheel the force is all outward, and if there is not a lot of metal on the outside of the spoke hole the flange can crack. Even a two-cross pattern puts considerably more stress on the flange than a three- or four-cross.

While radial spoking is sometimes touted as the pattern most resistant to lateral forces (the forces that move the axis of the hub independent of the axis of the rim), experimental data from Price and Akers show that the one-cross is actually stronger by a small percentage. The four-cross has the least resistance to lateral loads, about 12% less than the one-cross, but as the authors point out this is a minor difference, and lateral strength is the least significant of the three load factors (radial, torsional, lateral) because the bike leans into corners.

Even inexpensive factory built mountain bike wheels are adequate for the demands placed on them by the average rider. Depending on the sophistication of the wheel building machinery used, machine built wheels can be stronger than even the best hand-built wheels because high-quality machinery operated by an experienced worker can deliver a very consistent product. The Dutch-made wheel building machinery used by such major wheel building concerns as Wheelsmith and Winkel Wheel is capable of turning out forty pairs an hour with two operators.

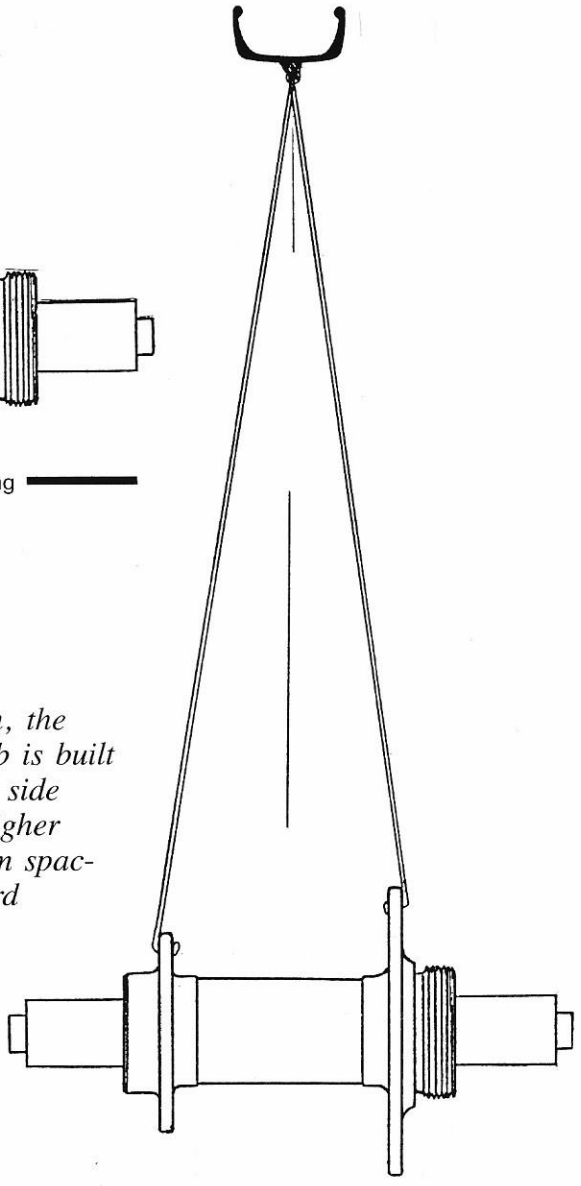




130 mm rear spacing

Because the cluster takes up room on the right side of the hub, a standard rear wheel must be built asymmetrically.

In order to reduce dish, the Wilderness Trail Bike hub is built 10 mm longer on the left side and the right flange is higher than the left. The 140 mm spacing is wider than standard dropout dimensions.



140 mm rear spacing

The wide rims used on mountain bikes have a huge margin of strength built in, and the extra air cushion of the fat tire protects them better than the skinny high-pressure tire protects a road bike rim. One key here is the amount of air in the tires. The rim is unlikely to suffer a "flat spot" unless it is so severely deformed by a sharp blow that all the tension is taken off one or more spokes. Through the miracle of pneumatics, if the tire casing is deformed, the pressure is distributed evenly to all parts of the interior surface (although this does not change the load on the weight-bearing spokes). While it is possible for a rim to suffer a flat spot without the tire bottoming out, underinflation is the most common cause of this type of damage.

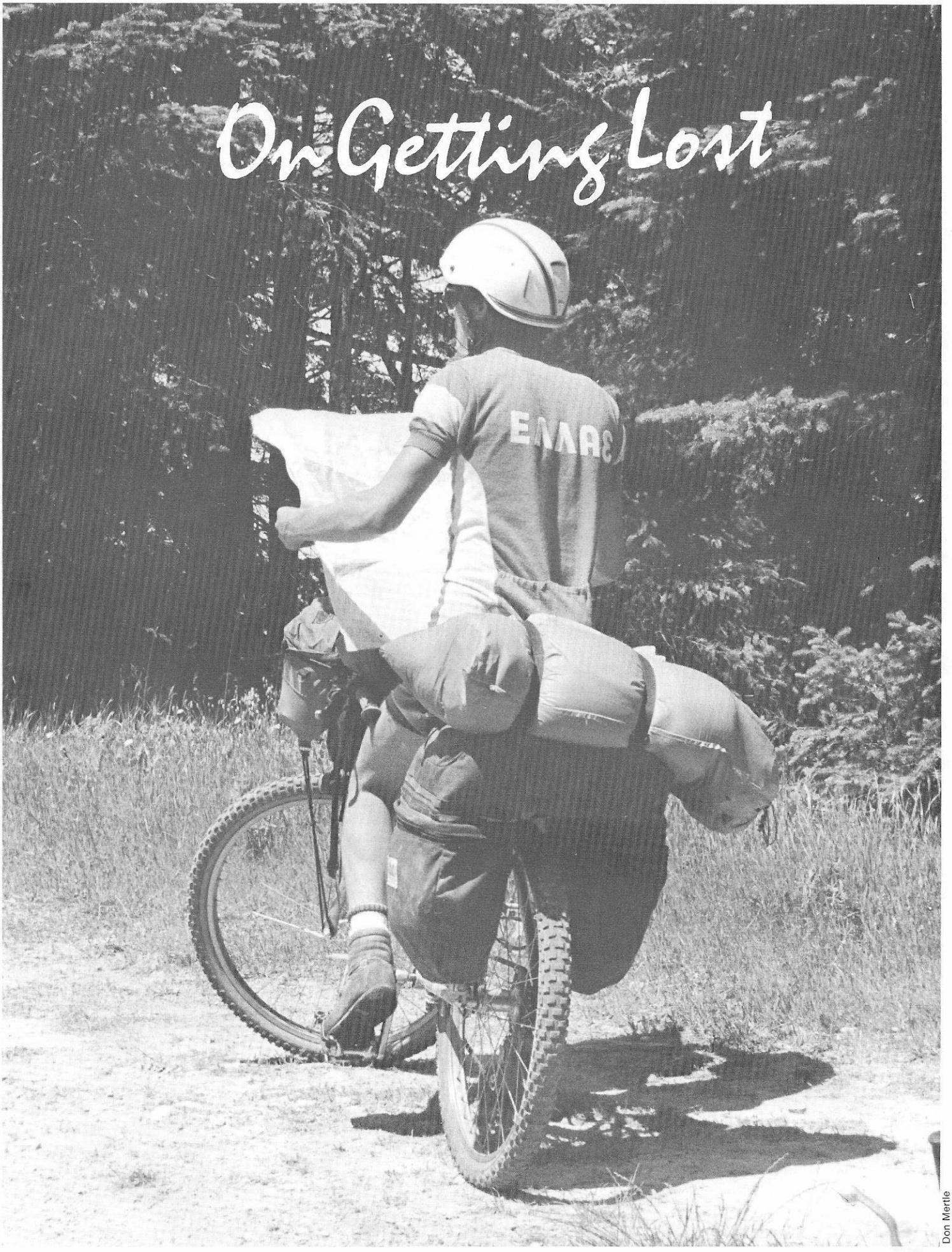
While pneumatic pressure distribution protects the rim from damage caused by radial impacts (at right angles to the axle), it doesn't do that much to redistribute loads on the rim that are parallel to the axle. So even high tire pressure won't keep a rim from going out of true side to side; fortunately, this type of misalignment is easier to repair than a flat spot.

For those who aren't familiar with the concept of wheel dishing, here's a quick review. Conventional bicycle designs require the rim to be centered between the dropouts. On a front wheel this is no problem, but the rear wheel on a derailleur gear bike has much of the hub's width taken up by the cluster, so the flange on the cluster side must be some distance from the dropout. If the other flange is brought in an equal amount, the total width of the hub between the flanges is reduced, which in turn reduces the length of one side of the triangle that gives the rim lateral strength. The solution used by most hub manufacturers is to keep the left side flange close to the dropout and the right side flange closer to the middle of the hub. When this is done it means that the spokes on the cluster side must be shorter than those on the non-drive side, and in order to keep the rim centered, they must be much tighter. Look at a rear wheel. You will notice that the spokes on the left side form a peak at the flange, while the spokes on the right side are much flatter. This is called "dishing."

Some manufacturers offer "dishless" wheels by moving the left flange further away from the dropout; for lateral strength it helps to make the hub wider at the same time. Mountain bikes have a longer standard rear axle width than most road bikes (because the wider tire requires the chain to be further away from the center line of the frame than on a narrow-tired road bike), and this feature lends itself to reducing the dish. A "dishless" wheel with a multiple-gear cluster is rarely built with no dish whatsoever, but the amount of dish is reduced to the practical minimum.

Tandem rear dropout spacing is sometimes as wide as 140 mm, and at this width it is possible to build a wheel with a minimum of dish and with a reasonable distance between the flanges for a wheel that is stiff laterally. Although 140 mm rear spacing creates new problems for the mountain bike framebuilder in the areas of chain line, chainstay bend and crank clearance, some builders have used a rear dropout spacing this wide, and by using a tandem hub this would seem to make the strongest possible mountain bike wheel.

On Getting Lost



Don Mertle

by Ross Kirkwood

It's not because people keep telling me to get lost that I spend most of my time getting lost somewhere or another. When I first started mountain biking, none of my friends had mountain bikes, so I rode alone and didn't try to get lost. It just came naturally. Later, when my friends got their own bikes, it was, "Kirkwood, where are you taking us?" And hell, I didn't know, I was just riding. Which brings me to my point, getting lost.

It's a lot harder to get lost than it may seem. I know that many people like to stick to what they know to be a good ride, avoiding what may end up as a quick course in bushwacking with a two-wheel snag machine. But taking that short forest road exit may be the best thing that ever happened to you. Imagine the prestige of taking all your friends on a spectacular road or trail that you discovered merely by being lost or by daring to risk the dead end or other mountain bike maladies.

Being lost doesn't mean you can't find your way home. It just means you don't know where the hell you are at the moment, or where you might end up. think it's also called exploring.

If you find it difficult to get lost on purpose, here is a tip. Ride uphill until you get to the top, then disorient yourself as you see fit, and proceed down the mountain as fast as you can, so fast that tears impede your vision. Now you are bound to have missed one or two turns and you are lost. Being lost is your license to explore.

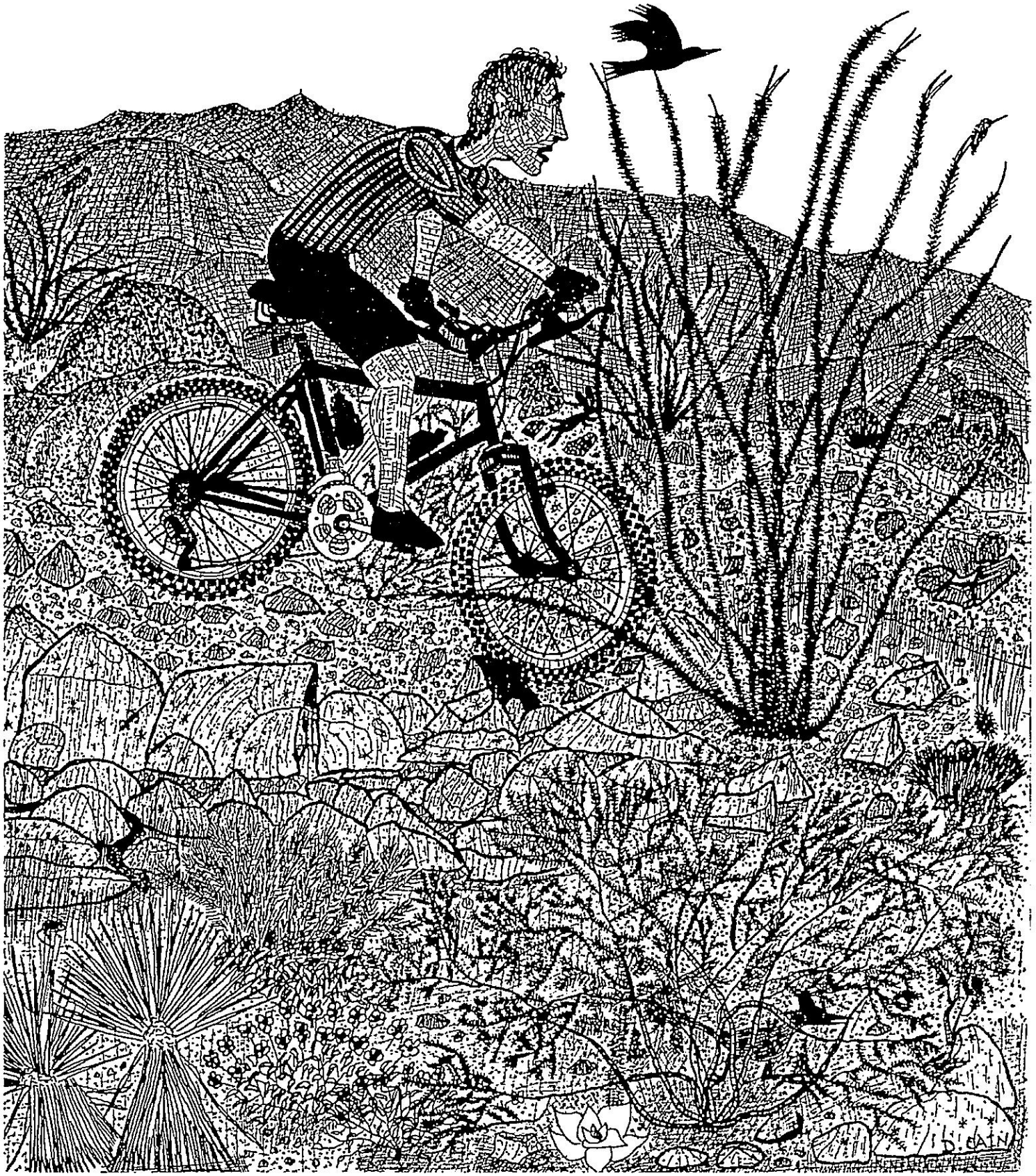
But if you don't know where you are, how do you get there again if it's worth going back to? Easily; the way back is probably uphill, so you'll have lots of time to study a return route.

A more sensible approach to all this exploring stuff is to get topo maps of the area you are going to, which will give you a good idea of places to explore or get lost in.

I was just on my way out the door to study some new techniques in getting lost. Hope to see you out there.

Lisa Jones

AHA! BAJA!



by Art Read

The zeroeth day of our Baja trip was spent in travel from our respective homes in the greater S.F. Bay Area (if Carson City, Nevada is in the greatest part of the Greater Bay Area). Running through the L.A. airport to make our connection, Sierra Touring Company founder Larry (Pigpen) Glickfield and I wished we'd been able to *ride* those bike boxes we were dragging behind us. Barring that, we were hoping that O.J. Simpson would hurdle a counter, scoop up our boxes like a couple of stray fumbles, and sprint off toward our next baggage check.

Much later that day, fourteen of us assembled in the beachfront campground at San Jose del Cabo, including the two tour leaders, Maggie and Paul. The three couples from Napa Valley all featured guys named Bob, which we soon sorted out by occupation and manner of attire as Bike Bob, Wine Bob, and Colorful Bob. Their respective mates, Mary, Karen and Lynda, had the good taste to show up with individual names, keeping the confusion quotient somewhere near normal (high, but hackable). Ron and Ken, two monosyllabic three-letter words ending in "n," either made things easier or added to the confusion, depending on how you remember names, by hanging out with each other a lot.

Let's see. . .then there was Larry and myself, whose name I forget, and Christi. Leonard made fourteen, and in his late fifties, he was the oldest kid on the tour.

O.J. stayed in L.A.

The barbed vegetation commanded our respect and precluded any thoughts of bushwacking.

The first day of riding skirted us around central San Jose del Cabo, where the van had gone in for three days worth of supplies and to take Larry to get his fork tip welded back on; it had rattled off on a previous tour.

As we waited for the van to bring lunch after thirteen miles, most of us got in the sea for some body surfing and some swimming. Leonard and I couldn't even wait that long. We weren't six miles into the ride when we noticed that it was hot, the sea was beautiful, and waves were being served just across a short, deserted stretch of white desert sand, gratis. So what if some of them were beach slammers. What do you want for free?

Leonard also got a free sample of cholla cactus in his leg on the way back to the road. Just brush one of those things and a whole section (actually a sterile fruit) six to nine inches long will jump right off the plant and hang on to you with tenacious microscopic barbs on its inch-long needles. Later we saw range cattle near the road which had cholla sections hanging from their faces. Punk rocker cows in Baja?. . .or just careless cattle. Whatever, these, the *ocotillo*, the *saguaro*, and the many other varieties of barbed vegetation commanded our respect and precluded any thoughts of spontaneous bushwacking!

Continued on page 16

Pete Blast

Continued from page 15

Maybe the waves and the free cactus were all part of the tour package. Because it was a supported tour, after a couple of days out, we just about forgot about money. Once we got a couple of miles (pardon me, *kilometros*) out of San Jose del Cabo, we saw but a handful of commercial establishments until we pulled into Los Berriles three days later.

Of course, when we rode into the only bar/restaurant *palapa* that we saw during the first two days, most of us had to sample the wares. Sure, the touring company supplied us with *cervesa* and plenty of good food, but how are you going to know just how cheap the beer is or how the local *comida* tastes without hanging out for a spell? Cyclists always seem to be able to cram another meal or two into a day when duty calls. Also, these stops kept us from traveling in a pack of gringos, totally insulated from the local culture. *Yes importante para practicar El Espanol, no?*

Alan Bonds

There in Tito's in Cabo Pulmo the hanging out was part of the experience. Our breakfasts (after fifteen miles had settled Maggie and Paul's pancakes a bit) of eggs and potatoes took so long to appear that we figured they had to grind the corn for the tortillas, maybe even grow some of it. But hey! This is life a long way to the right of the slow lane! The locals, the amazing scenery, the scarcity of people, the nonchalant range cattle and the road, all conspired to lasso the fast-lane gringos and mellow them out, *pronto.*

Ah the road. The hardpacked, sandy road we traveled most of the trip was largely washboard except for the usual strip of smooth stuff either along the side or down the middle. The smooth part was fairly fast dirt, but only two or three times 2.125 inches wide at best. The other border of this smooth strip was usually a few inches of loose sand. So when your "sweet strip" runs out, you typically hit some sand, cross two wide strips of washboard with a sandy center and maybe find some sweetness on the other side. If you open your mouth wide and sing while you cross over, your voice sounds like "wvooof (fat tires in sand) A-A-A-A-A-A-A-A-S wvooof (fishtail) A-A-A-A-A-A-A-A-Aaaaaaahhh!

If that doesn't slow you down, then you probably have washboard wheels and you've been working out on your sand-load simulator all fall.

Of course, this maneuver puts you on the wrong side of the road now and then, but in Baja you can count the number of cars you see in a day without running out of fingers and toes (if that's how you do your counting). And when they do come, it still doesn't matter where you ride, because both sides of the road are the wrong side. It's a Baja paradox that the drivers on paved roads travel slowly, in contrast to the road manners in the rest of Mexico. But on the washboard back roads the bumps kind of even out at fifty or sixty miles per hour, so that's the average speed. You see the dust cloud quite a ways off, or hear them coming from behind, and just bailout until the mechanical storm passes. *No problema!*

The first day I tried to see if I could even out the bumps like the cars do. It sort of worked, downhill, if I kept my wrists and knees loose, stayed off the saddle and spent a lot of time in the air. This got Colorful Bob excited when I passed him going down one hill. He blew by me, the race was on, and I had to try to iron out the wash at the upsides, too.

U-U-U-U-U-U-U-U-U-Unh! Okay Bob, you win.

I spent the rest of the tour thinking, "This is not a race, and it's not a jackhammer exhibition. . . kick back and enjoy, Leroy."

So I did, and I did, and I did some more! There's plenty to enjoy on this tour. Sleeping on near-deserted beaches and riding where the population is so sparse that most humans you encounter are glad enough to see you that they'll wave, gives you the feeling of having really *been* somewhere.

Copping a swim in that warm, crystal-clear water at the end of the day's riding was mighty pleasant, even

after the surf went flat. There were reefs here and there on the journey where the colorful water life could be snorkled and spied. In these places more than just factory-installed swimming equipment comes in handy. Then again, snorkels, masks and fins aren't always necessary for seeing the amazing sea life.

Above Los Barriles, on the 40-mile hard-core optional route on day number four, Larry and I were nearly land-snorkled by two of these big, colorful, scaly sea-critters as we stood on the beach. We'd just cooled our brains in the sea, when a brightly colored yellowish fish nearly a foot long escaped being lunch for one of those *big* bluish jobs with with the pleated dorsal fin that the big game fishermen go after. The yellow guy nearly borrowed our towel, but the shallow water at the beach saved him from the big blue guy. If they'd had their SCOBA ("O" for Outawater gear) I'm sure they would have chased right up the beach, bagged our bikes and ridden outasight!

That day's ride was challenging, with a couple of thousand feet of hot inland climbing after some trials-hard coastal rolling cliffs (with sweet views), which followed some high-resistance sand-load training on the dirt road. The previous three days we had ridden 20 to 25 miles each, but none of that had been as hilly as we might have expected from the coastal riding. A mid-winter tour like this could have found a cabin-bound body out of shape for a grinder day like number four if that ride had been on the first day.

Day four also had the option of an easier route, and any who wanted to could hop in the van for all or any part of the day's distance. *No problema aqui!*

The final day of the Tour was preparation for re-entry into sillyvization. Two-thirds of the riding on day five was on pavement, including a ten-mile downhill into La Paz. . .which followed a ten-mile uphill out of Bahia de lan Ventana.

Ostensibly the main purpose of the trip was to catch a view of Halley's Comet from as far south as you can get and still be in some place called "California." We did see that little fuzzball early the first morning with our naked eyeballs and binoculars, but as an event, it paled to the rest of the week.

Back Issues

We couldn't possibly take the time to answer everyone who has asked about back issues, so we'll do it here. Some issues are out of print and out of stock, never to be seen again except by those who subscribed early. We do have available copies of some of our back issues. You will be interested to know that the price indicated includes postage, which costs us more than the bulk rate we use for subscription copies. Price of back issues is $2.50 per copy. Outside the U.S. add $1.50 (U.S.) per copy.

March-April 1982
(Cyclo-Cross, Ricky Cha, MudPup)

May-June 1982
(Reseda-to-the-Sea, Coyote Derby, San Anselmo Race, Ricky Cha, MudPup)

July-August 1982
(Race Reports, Carmel Valley Clunker Tour, Here Come the Kids, Ricky Cha, MudPup)

January-February 1983
(The Wheel Thing, Crested Butte Tour, Las Vegas Show, TechTips, Fat Tires Explode in America)

March-April 1983
Gearing, NORBA, Glossary, Balmy the Frog, TechTips, Products)

July-August 1983
(Of Bikes and Men...and One Crazy Lady, Brake Review, TechTips, Frames...Why Custom?, MudPup, Shimano Grand Prix, Poetry Corner)

January-February 1984
(Crested Butte, Race Results, NORBA vs. USCF, Wreck Tips, TechTips, Trail Etiquette, MudPup)

July-August 1984
Joe Murray Interview, MudPup, TechTips, Wreck Tips, Whiskeytown Downhill, Tecate to Ensenada, Book Review)

September-October 1984
(Flyer Jets to Japan, Mulga Bill's Bicycle, Chequamegon, Fat Tire Festival, Get Thee Behind Me, MudPup, TechTips, To the Top Down Under)

November-December 1984
(An Elder of the Off-Road Tribe, Mountain Bikes in Mountain State, Uncommon Options, Point Reyes Update, TechTips, NORBA Nationals)

February-March 1985
(Call to Perspective, Poetry Corner, Race Reports, TechTips, Uncommon Options, FatNotes)

April-May 1985
(Fat Tire Touring, Al Farrell, Guest Opinions, Products, Uncommon Options, Punk Bike Enduro, FatNotes)

June-July 1985
(Biking in Brooklyn, Mountain Bike Anecdote, FatNotes, Fat Fotos, TechTips, Products, Minority Opinion)

November-December 1985
(Kamikaze, Flume Trail, Bodfish, Moab Slickrock, TechTips, Wreck Tips, Sport Racin', USCF/NORBA, Race Warp)

January-February 1986
(Trials Issue: Nicol, Norton, Earley, TechTips, Out to Launch, Ice and Snow, Wreck Tips, Bodfish, MudPup, Mountains in Missouri, Fastest Fat Chances, Ratios)

March-April 1986
(Touring Issue: Max Hirshberg's Yukon Ride, The Arctic Cycle, Bicycle Trafficking in Bolivia, Tour Roundup, Uncommon Options, Universal Bike Review, Uncommon Options, Products, MudPup, Bodfish, Wreck Tips, Leapin' Lizard Downhill)

May-June 1986
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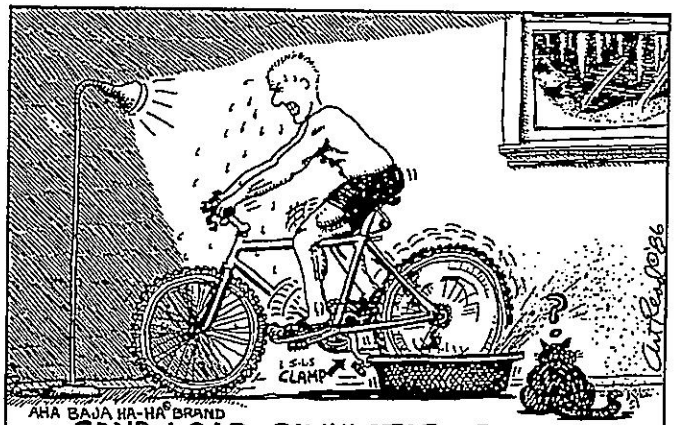
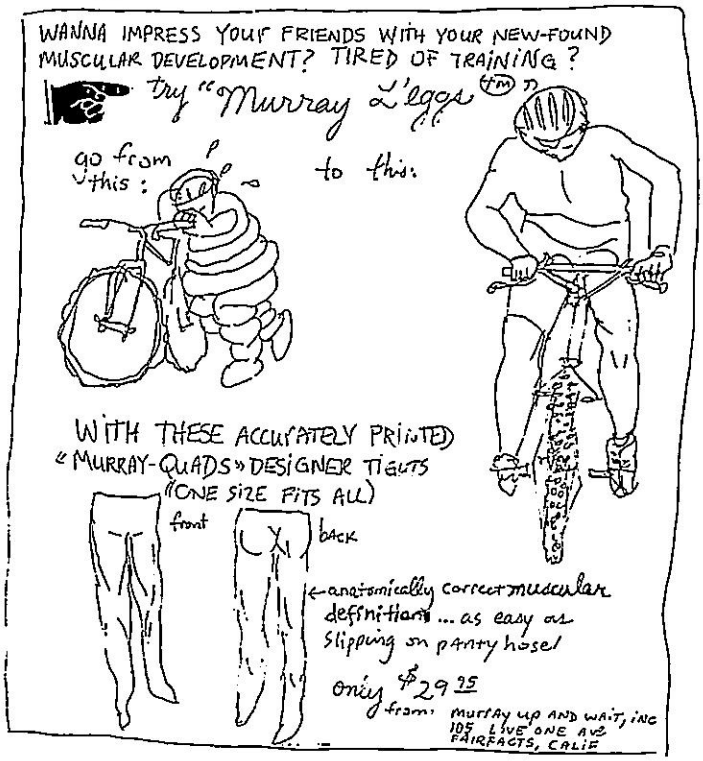
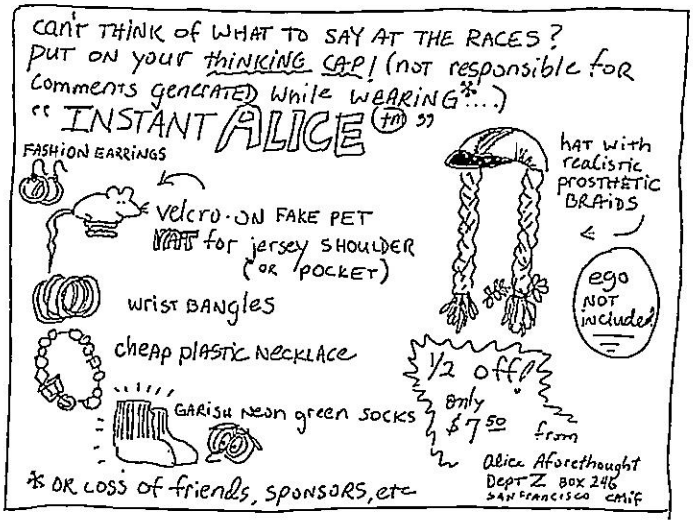
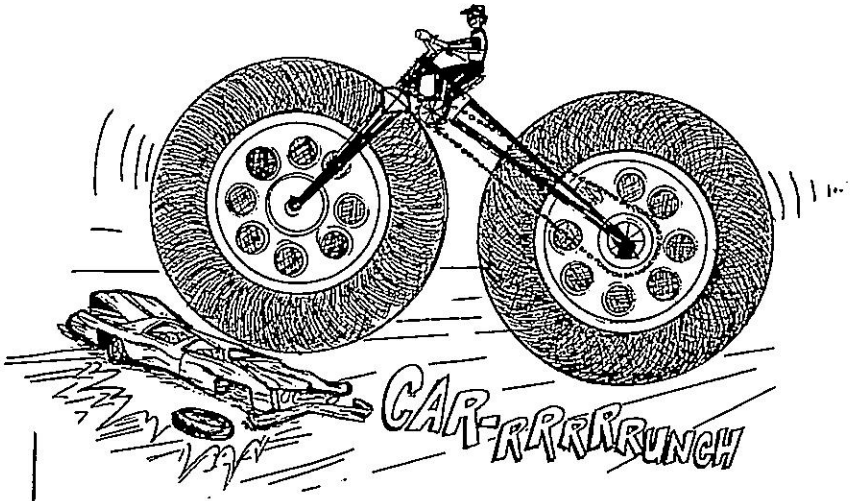
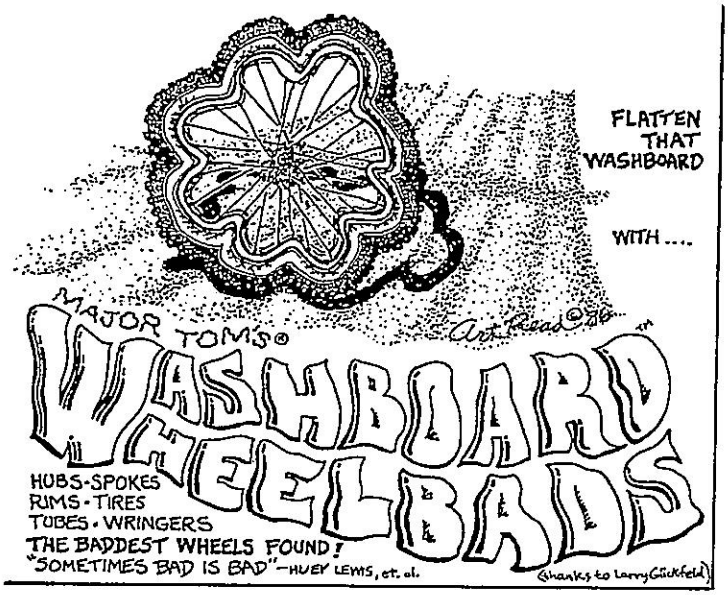
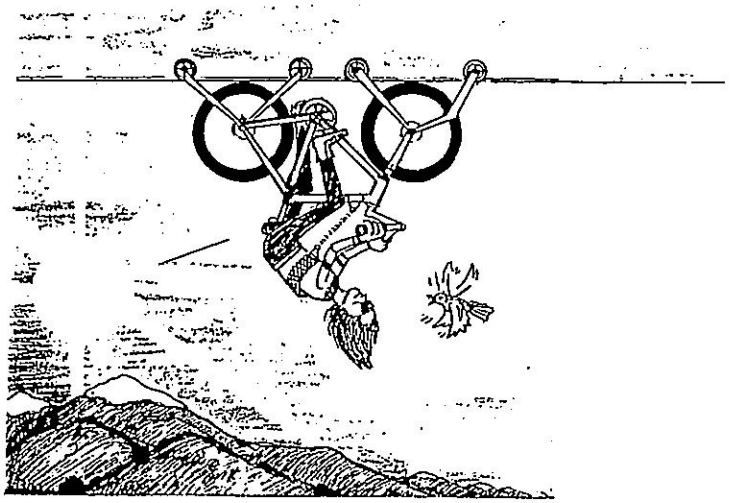




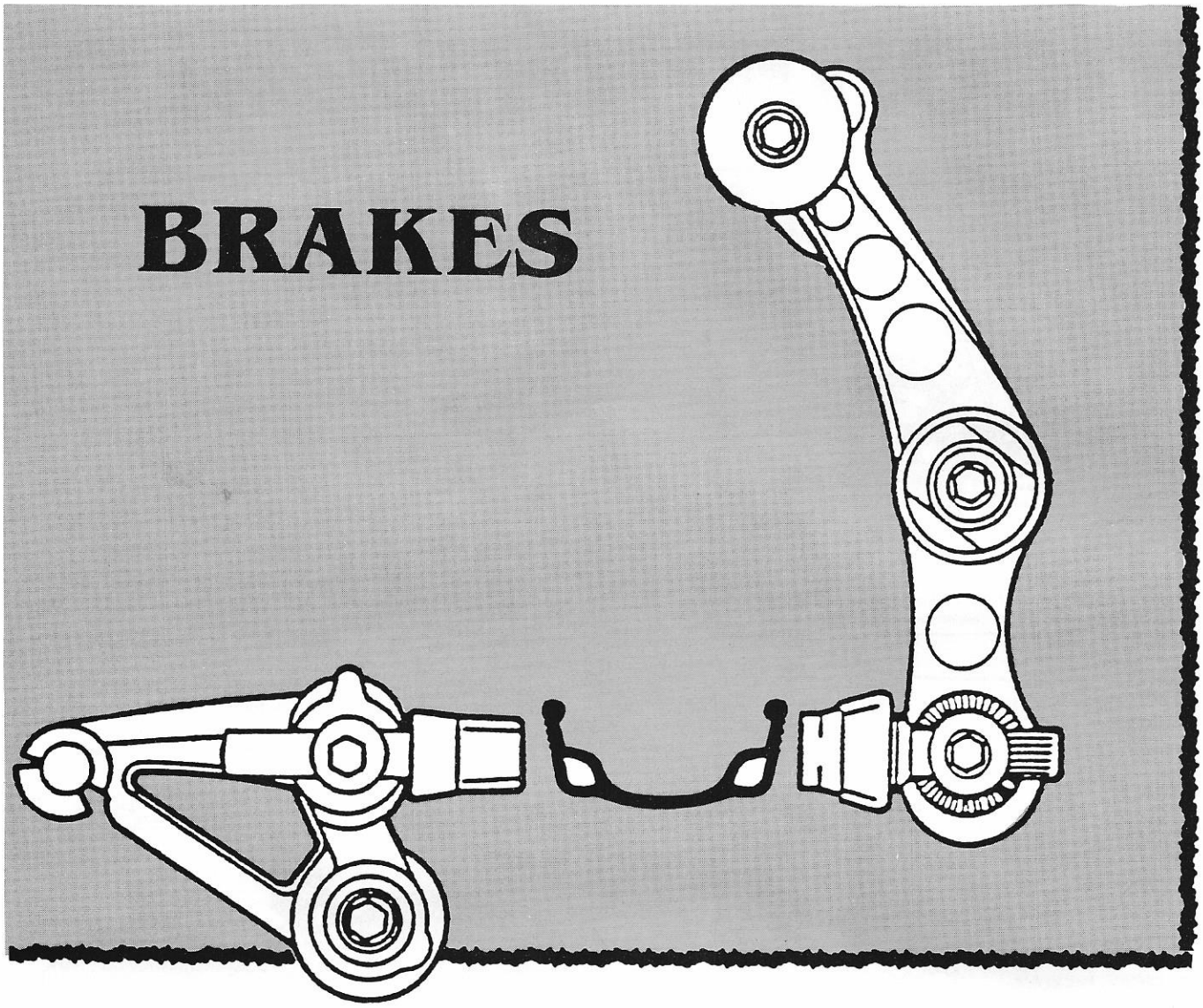








BRAKES



by SeeKay

In the past few years several new mountain bike brake designs have appeared, notably the "roller-cam," which, like the popular cantilever brake, requires a set of welded-on pivots. The primary advantages of welded-on brakes are that (1) they can't vibrate loose, and (2) they provide more stopping power, especially to a wide wheel with a large tire, than a traditional caliper brake because the arms are shorter and have less flex. These advantages are enough that virtually every off-road bike now sold uses welded on brakes, either cantilever or roller-cam, with hub drum brakes and caliper brakes running far behind in popularity.

For perfect efficiency the ideal brake cable system should have no cable stretch or housing compression. Nothing is perfect, and as the cables stretch slightly and the cable housing compresses, efficiency is lost. On some bikes a short length of housing leads the rear brake cable to a set of cable stops on the frame and the bare brake cable runs between the cable stops. On other bikes the full length housing is routed through guides with no cable stops on the frame. Full length housing is usually a light gauge so it will fit through the standard cable guides found on cheaper bikes. The lighter gauge cable stretches more than the heavy-duty motorcycle cable used on the best custom bikes. Cable stops on the frame make for more efficient braking because they do not have any appreciable compression when the brake cable is pulled, and the bare cable run replaces a length of cable housing that would otherwise compress.

There is no "best brake" for all conditions. Choice of brakes may vary depending on the rider's bicycle, riding style, and available terrain. There are several trade-offs between roller-cams and cantilevers which can affect the choice, and each rider should consider the strengths and weaknesses of these popular designs in selecting a system.

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Because cantilever brake pivots are positioned between the rim and the axle, the stays or fork blades on which they are mounted can spread slightly when they are applied, adding springiness to the braking feel. Since cantilevers are mounted slightly further away from the stay than roller-cams, they tend to twist the stay a little more when they are applied, once again adding springiness. Roller-cam pivots are mounted outside the radius of the rim, closer to the cross-brace